

FACILITIES MASTER PLAN

BOARD PRESENTATION

JANUARY 18, 2024

# BURBANK UNIFIED SCHOOL DISTRICT

PERKINS EASTMAN

Human by Design

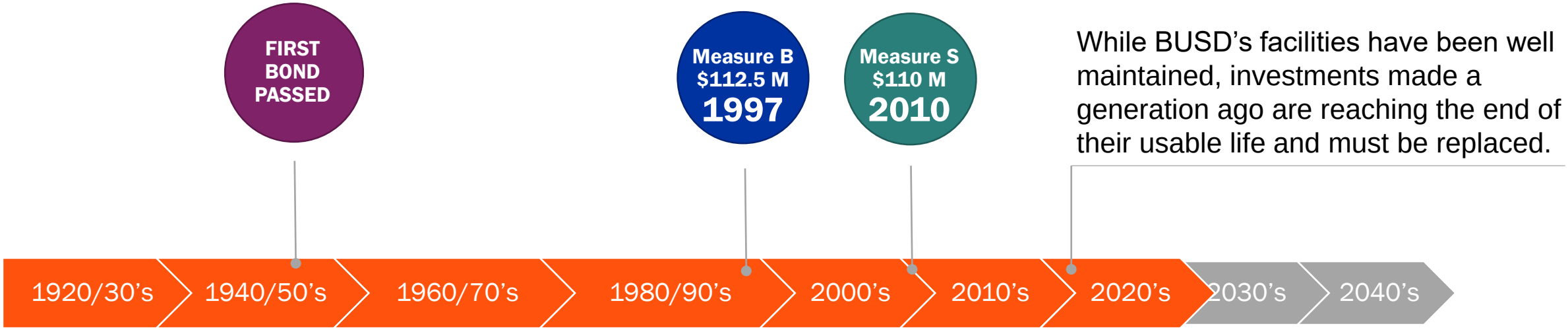
# Agenda

- Overview of Executive Summary
- Highlights
- Questions

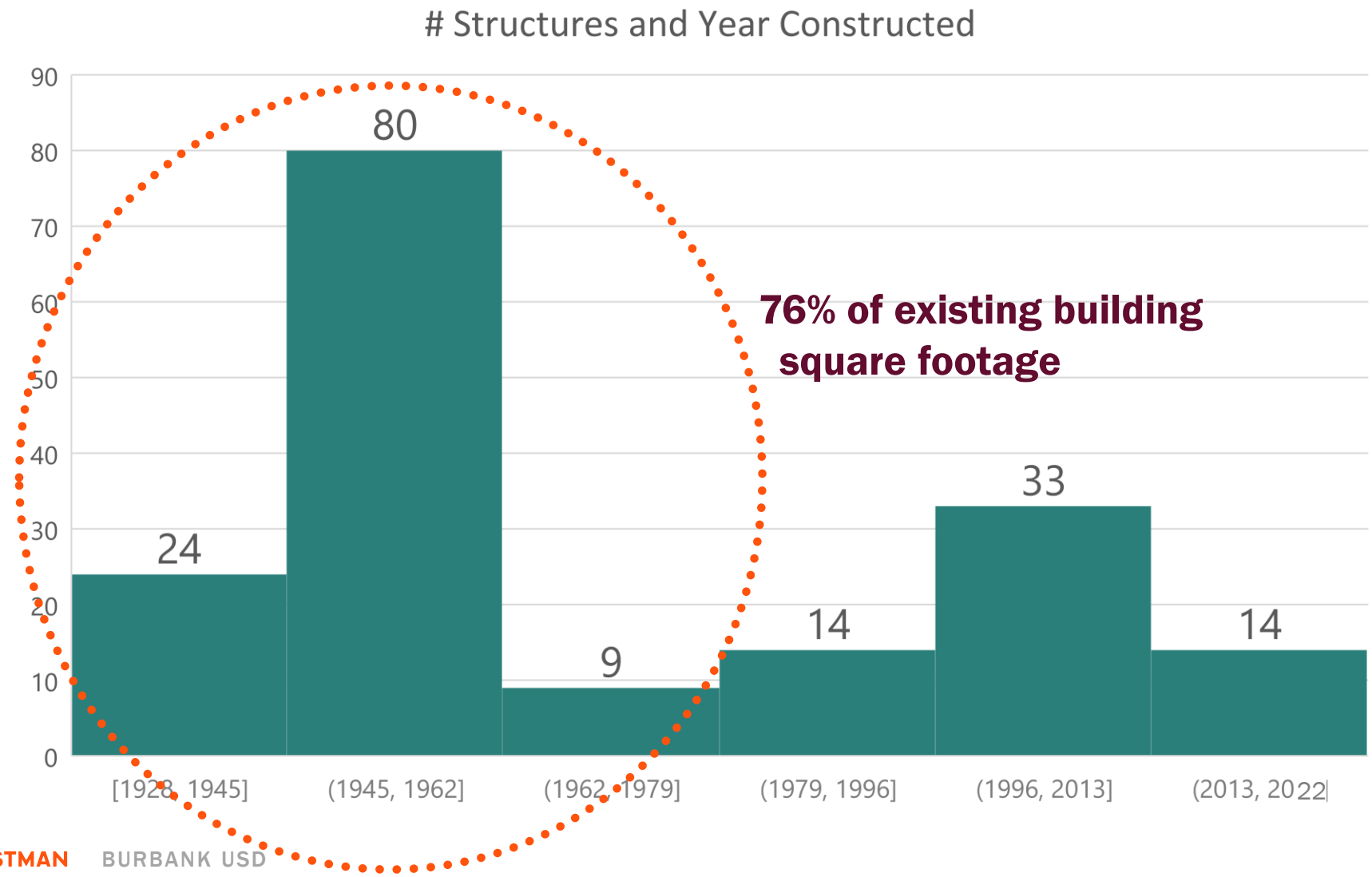


# Why does BUSD need an FMP?

**“A facilities master plan is a document describing a strategy to address the need for facility improvements and for capital investments to support current and future educational goals.”**

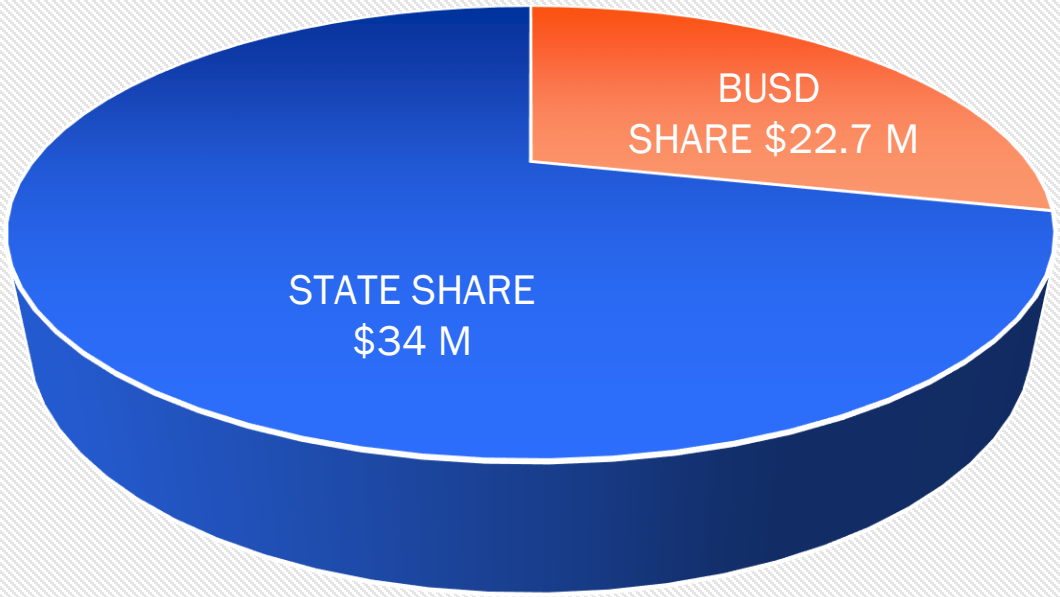


# BUILDING AGE



# BUSD State Funding Potential

## Potential State Modernization Funds (2023$)

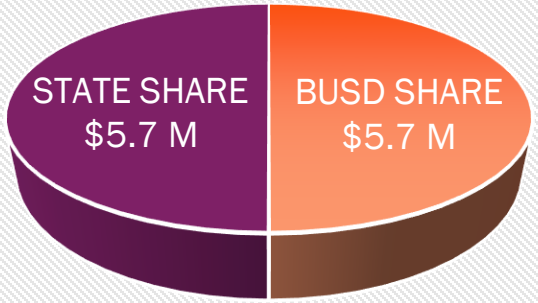



**$11.5 M**

**$56.8 M**
(20 schools)

TOTAL
**$68.3 M**

## Potential State New Construction Funds (2023$)




**Note**:
AB247 K-14 State Bond in 2024 = $14 B
Current Workload and approvals > $ 5 B
To capture state funding – need eligibility, CDE / DSA approved drawings, District matching funds and OPSC / SAB applications

# Public Survey

- Responses received for every school
- Most schools have more than 10 responses
- Valuable input on objectives, goals, and priorities

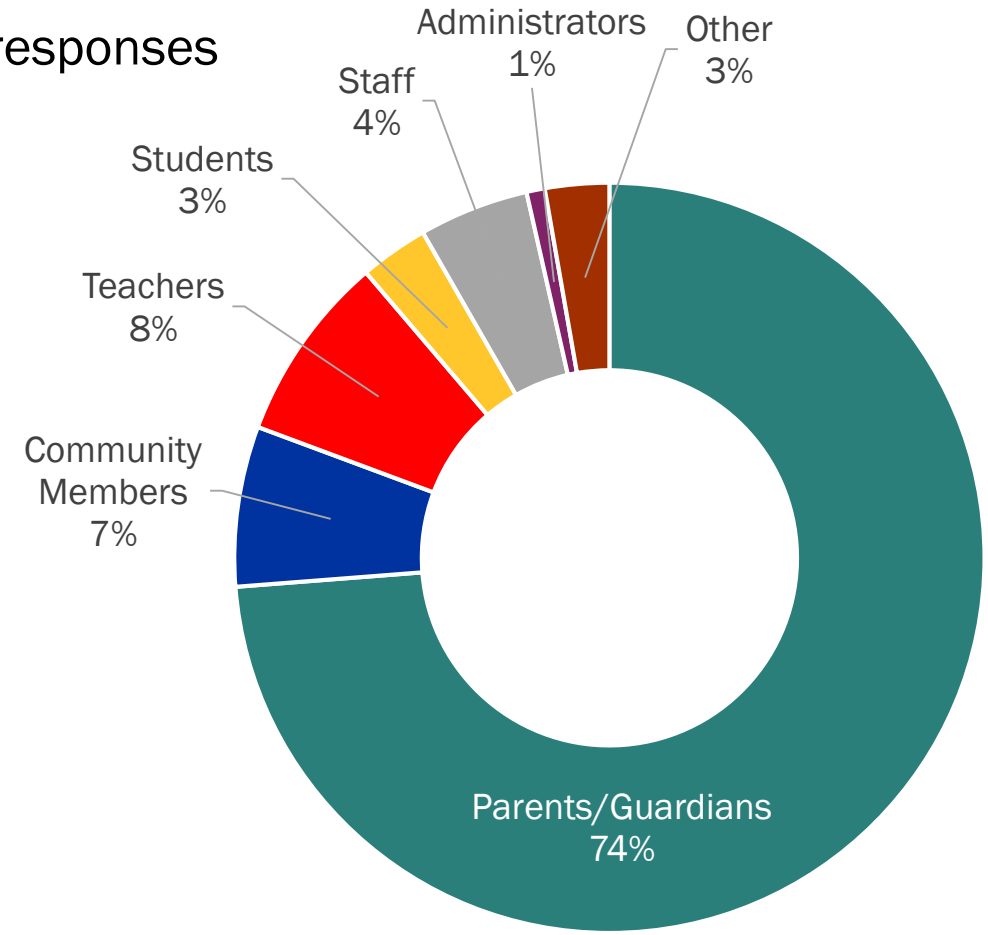
*“The community is tight knit, and they truly care about ALL of the schools, not just the ones they are zoned for. If they aren’t all succeeding, the community works together to raise each school up.”*

*“Big green fields, access to extra curricular activities, great teachers. Community.”*

*“Burbank has a small town feel with teachers who are dedicated to the students and have a connection to the community.”*

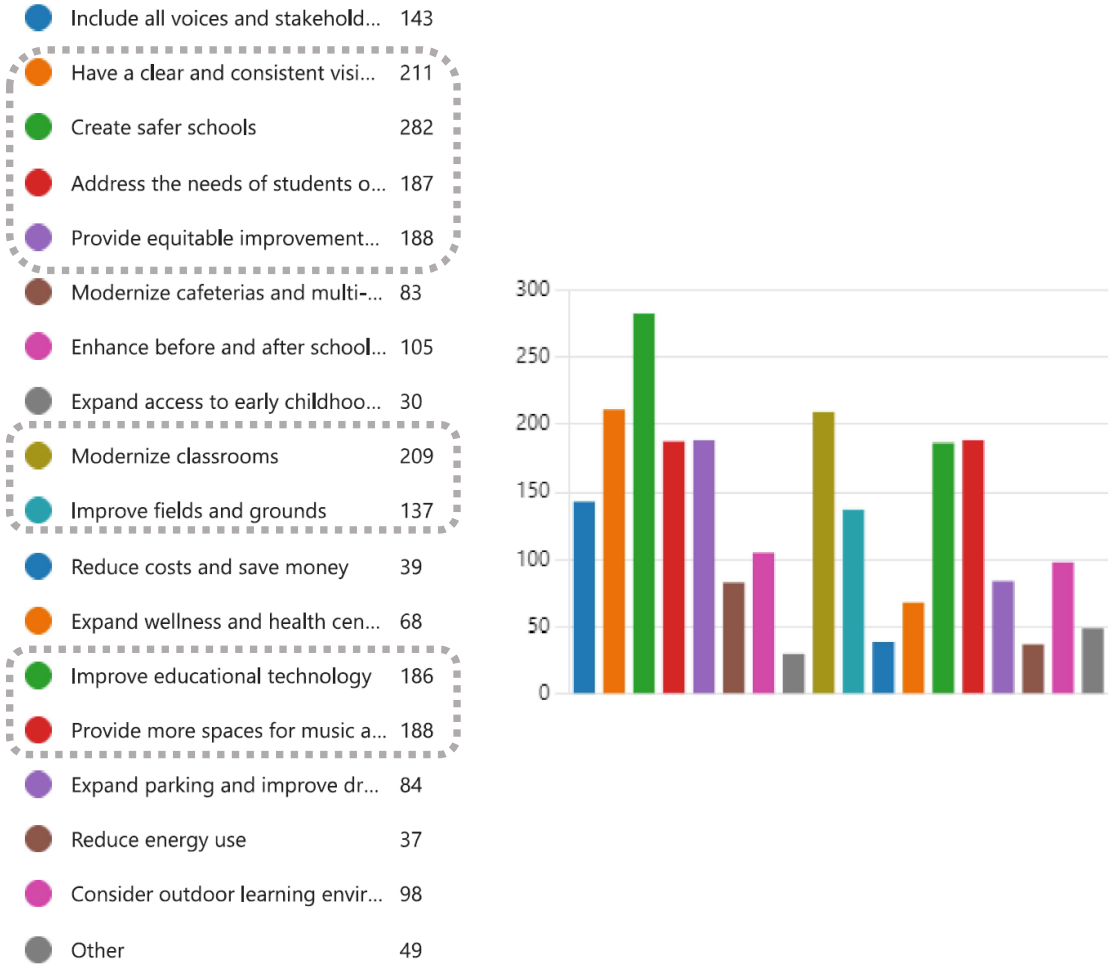
510

responses

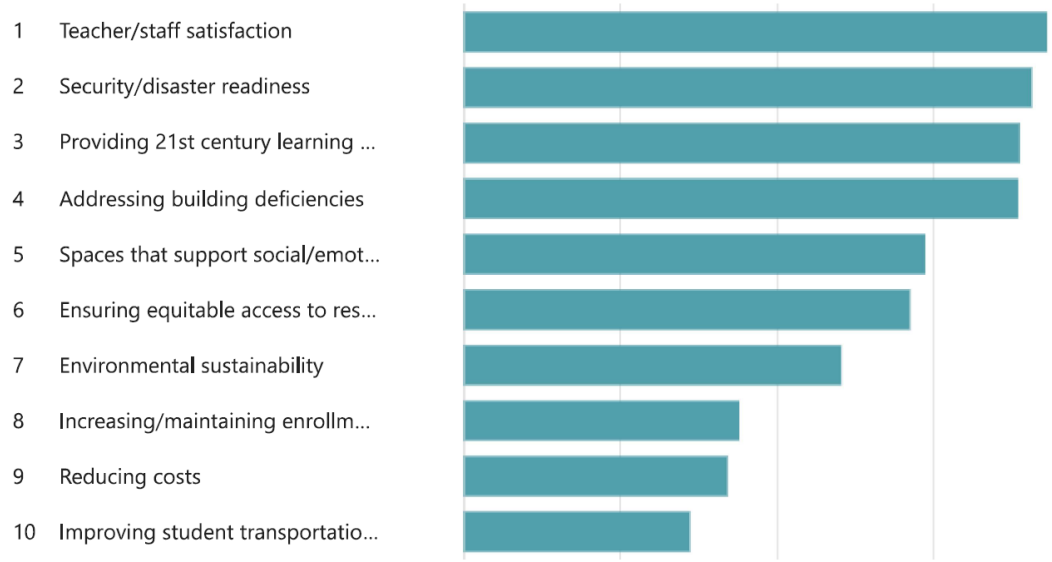


# Survey Results

5. This Facilities Master Plan will not be a success if it does not _____? (Please choose 5)




4. Please rank these considerations in order of importance for this Master Plan: (click and drag the options below to rank from 1 to 10)



# Planning Guiding Principles

Developed through engagement with District leadership and school stakeholders, these principles will guide the planning process and inform the identification of needs and projects.

Create **safe** schools that provide a **secure** environment for students, staff, and families.

Ensure every student has access to **high-quality learning environments** equipped with **state-of-the-art technology** that supports **innovative pathways** for success.

Make **smart and efficient investments** to modernize and maintain buildings, grounds, and infrastructure.

**Recruit and retain** high quality employees.

Support the physical, emotional and mental **wellness** of each student and staff member.

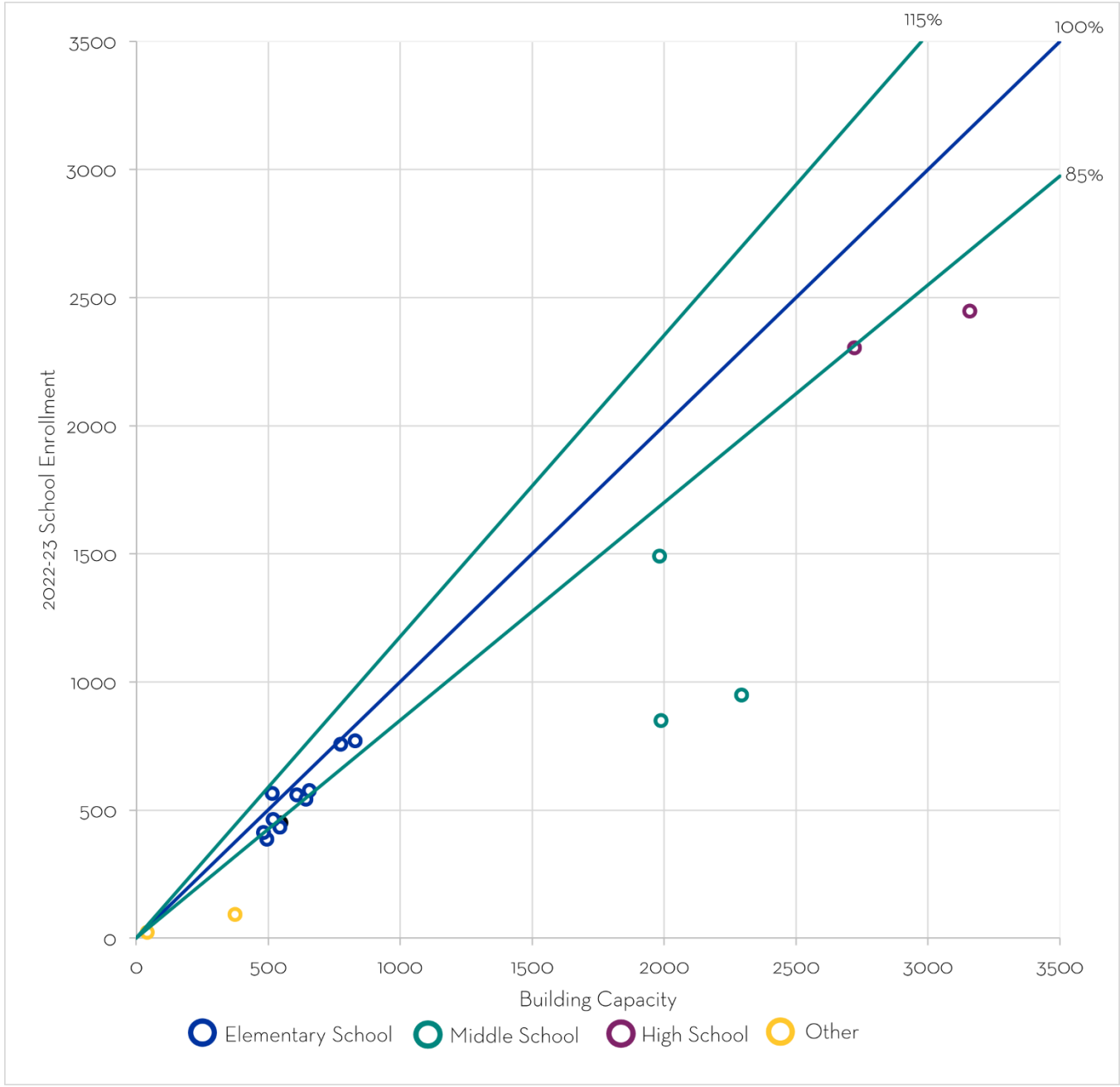
Provide superlative spaces for **art creation and performance** which align with Burbank's premier arts programs.

Invest in a **sustainable** future for Burbank's students; ensure **resiliency** against future environmental shocks.

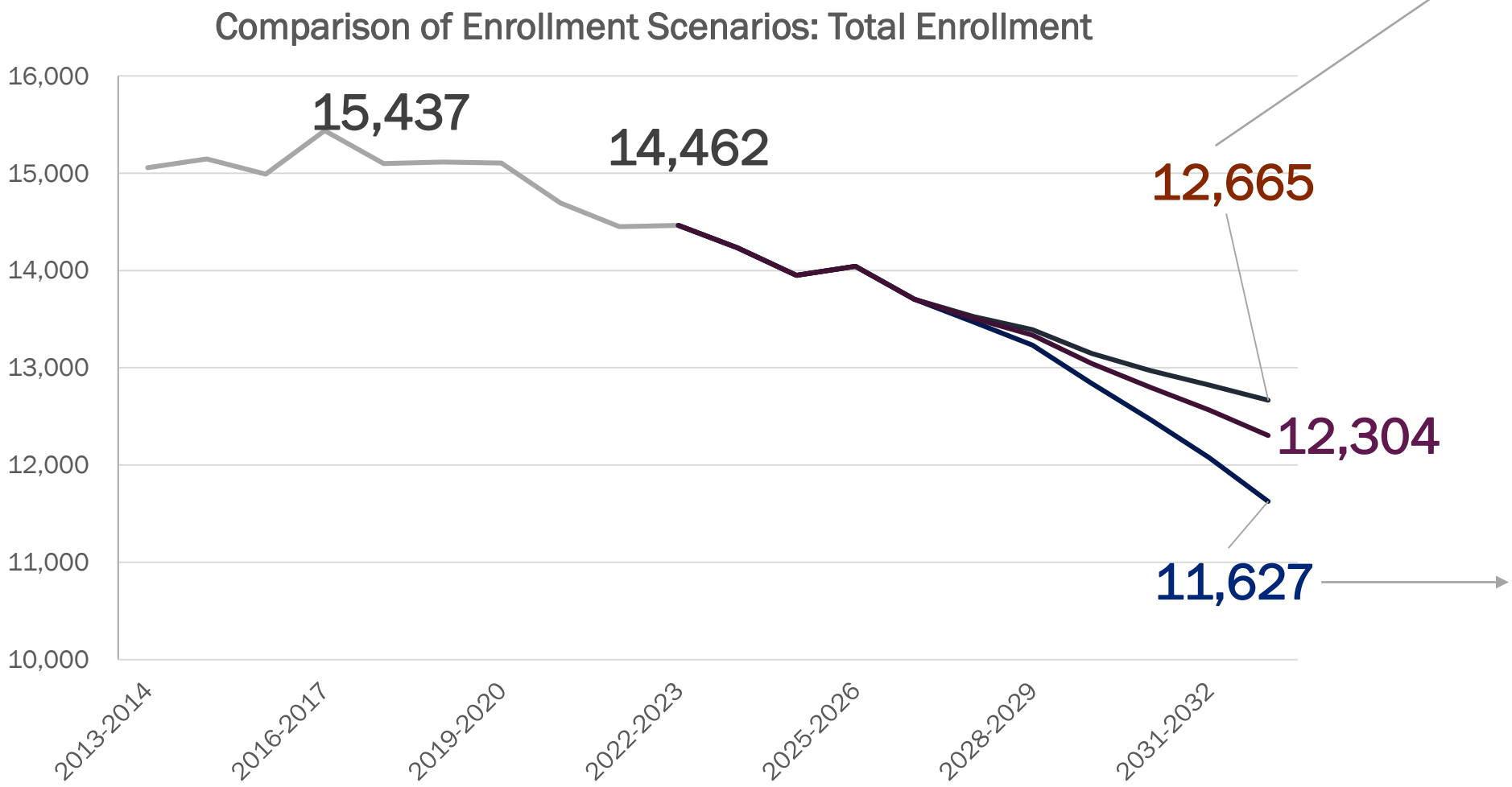
Provide resources **equitably** to support programs that promote a **diverse and inclusive** school communities.

# District-Wide Utilization

- Optimize educational spaces across all schools within the district.
- Majority of elementary schools fall along the 100% line
- Secondary schools fall below the 85% line.
- Non-loaded and loaded spaces are factored into these calculations



# Projected Enrollment



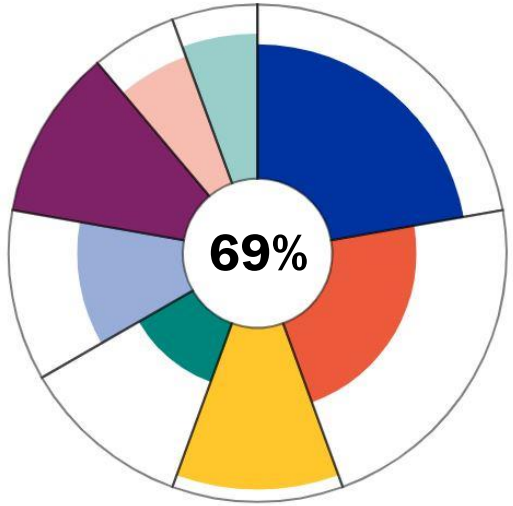

**High Estimate:**
-12% from 2023 to 2033
Assumes 2% increase in birthrate from 2023

**Mid Estimate:**
-15% from 2023 to 2033
Assumes no change in birthrate from 2023

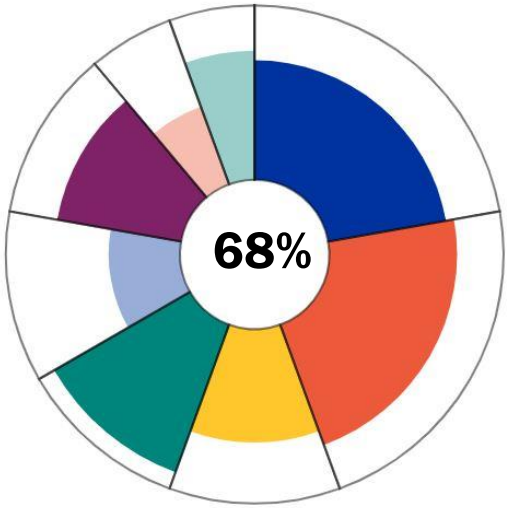
**Low Estimate: 20%**
-20% from 2023 to 2033
Assumes 4% annual decline in birthrate

# Educational Adequacy

Perkins Eastman developed a research-based Educational Adequacy tool that evaluates and measures the school buildings ability to support the whole-child and their social, emotional, and academic growth.

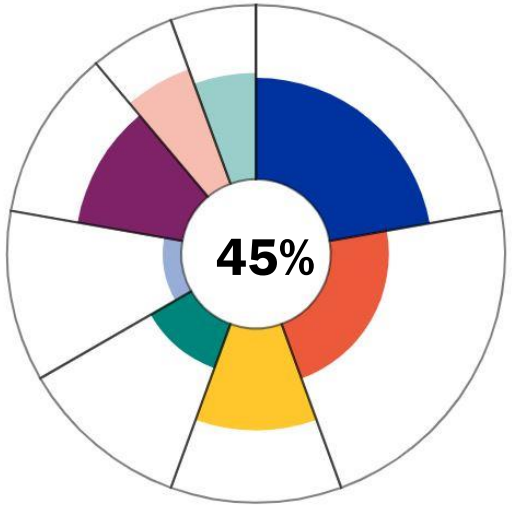



**Miller Elementary**

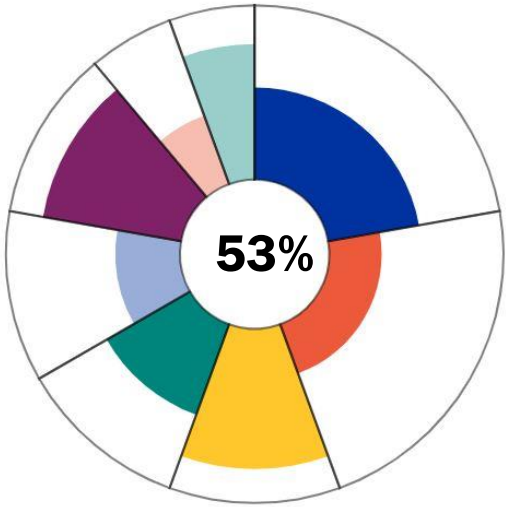



**Providencia Elementary**

- Classroom
- Safety & Security
- Presence
- Assembly
- Extended Learning
- Organization
- Community
- Environmental Quality



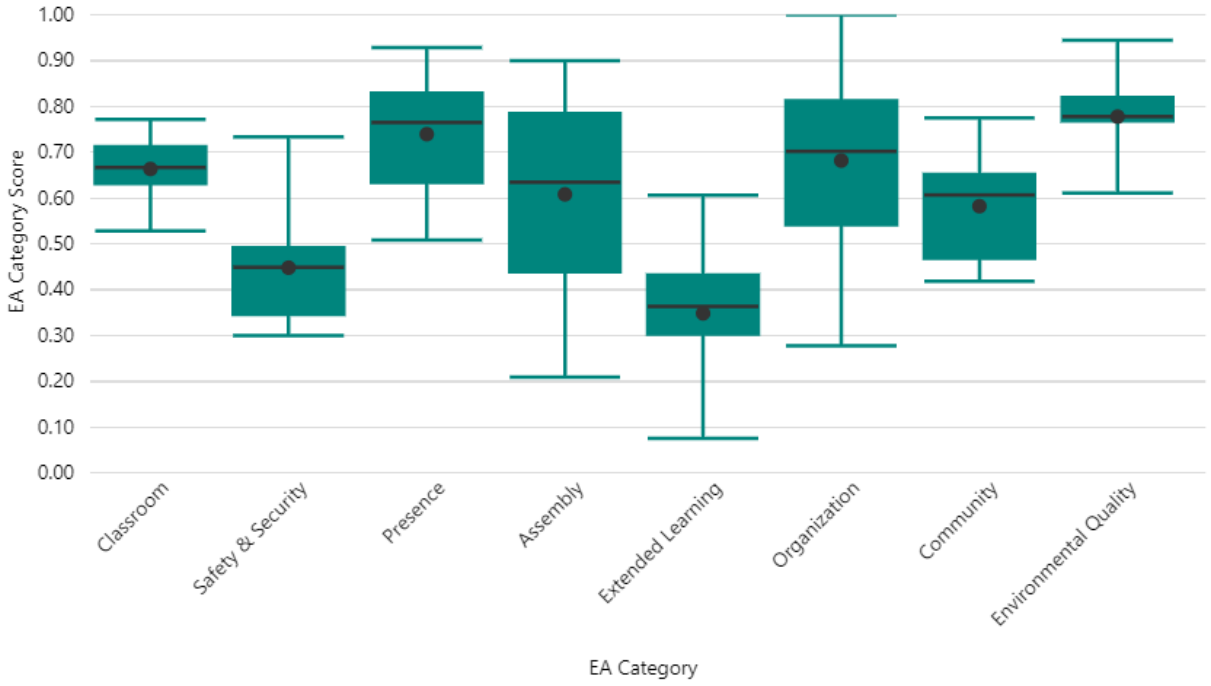

**Edison Elementary**



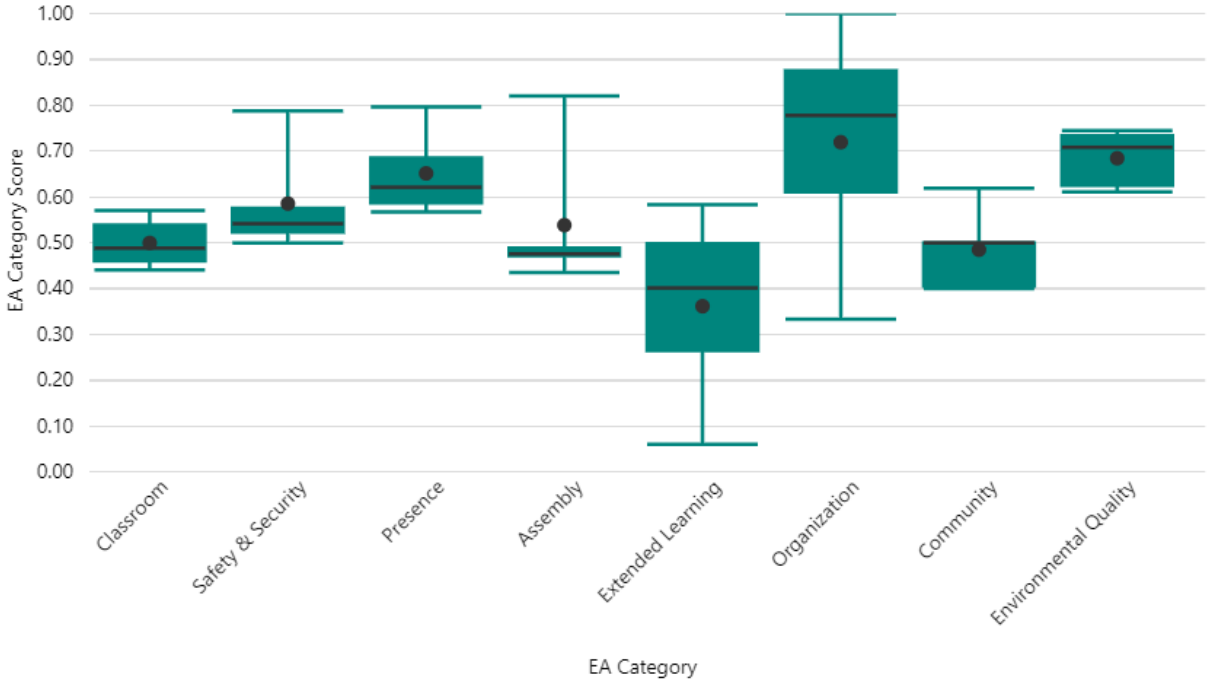

**Emerson Elementary**

# Educational Adequacy at Secondary and Primary Schools

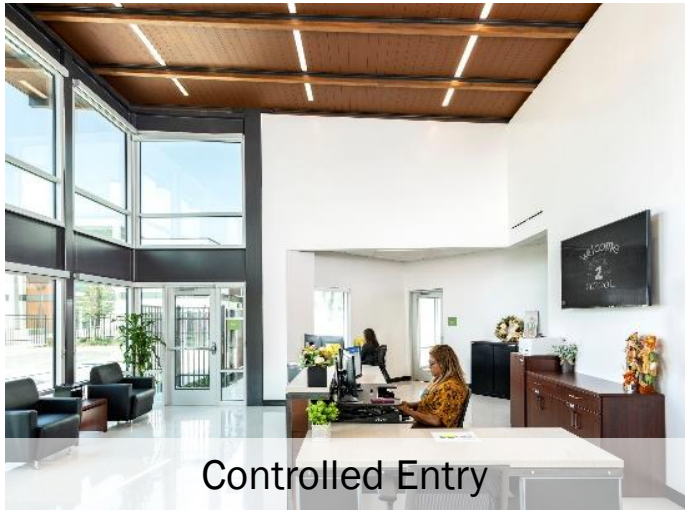
## Elementary Schools




## Secondary Schools



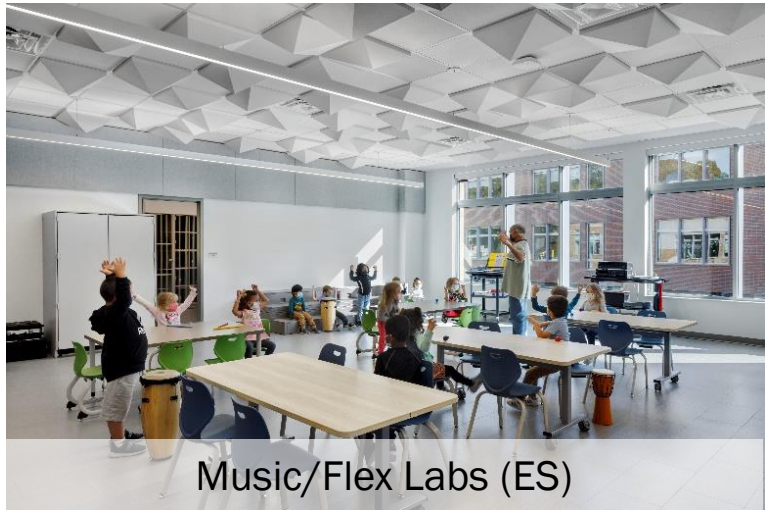
# Select Projects Resulting form EA Findings


Controlled Entry


Professional Development


Care Centers (ES)

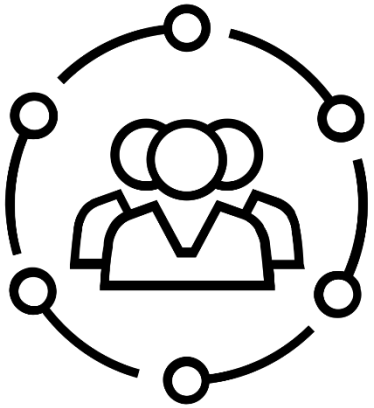

Science Labs (MS, HS)


Music/Flex Labs (ES)


STEAM Lab

# How were projects determined?

COMMUNITY FEEDBACK, CONDITIONS ASSESSMENTS, EA, GP/LCAP, INTERVIEWS



Community Feedback



School Leader and Department Leader Interviews



Facility Conditions Assessments

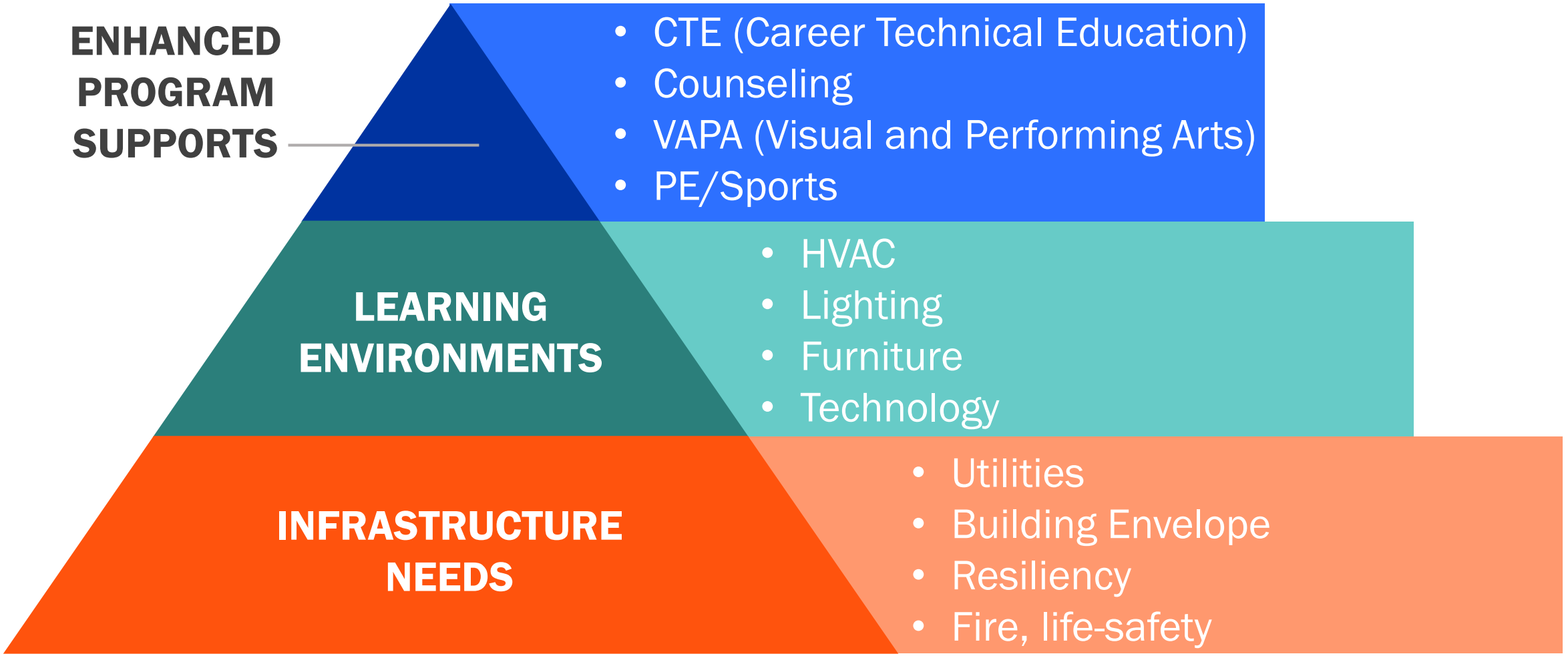


Educational Adequacy Assessments



LCAP Goals

# Prioritization Framework



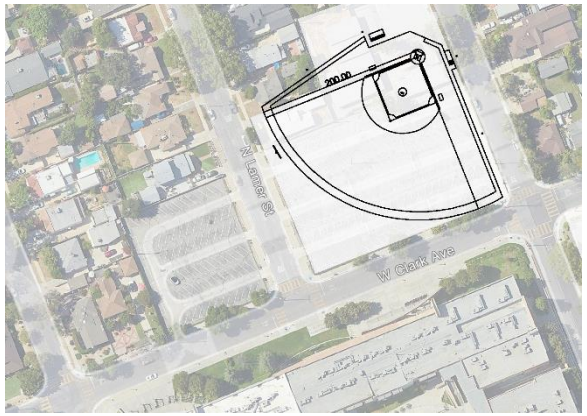
# Tiered Scope Groups

## PRIORITY 1A



Priority 1A projects are associated with site safety and infrastructure upgrades

## PRIORITY 1B




Priority 1B projects are associated with equitable access

## PRIORITY 2




Priority 2 focuses on improving the learning environment

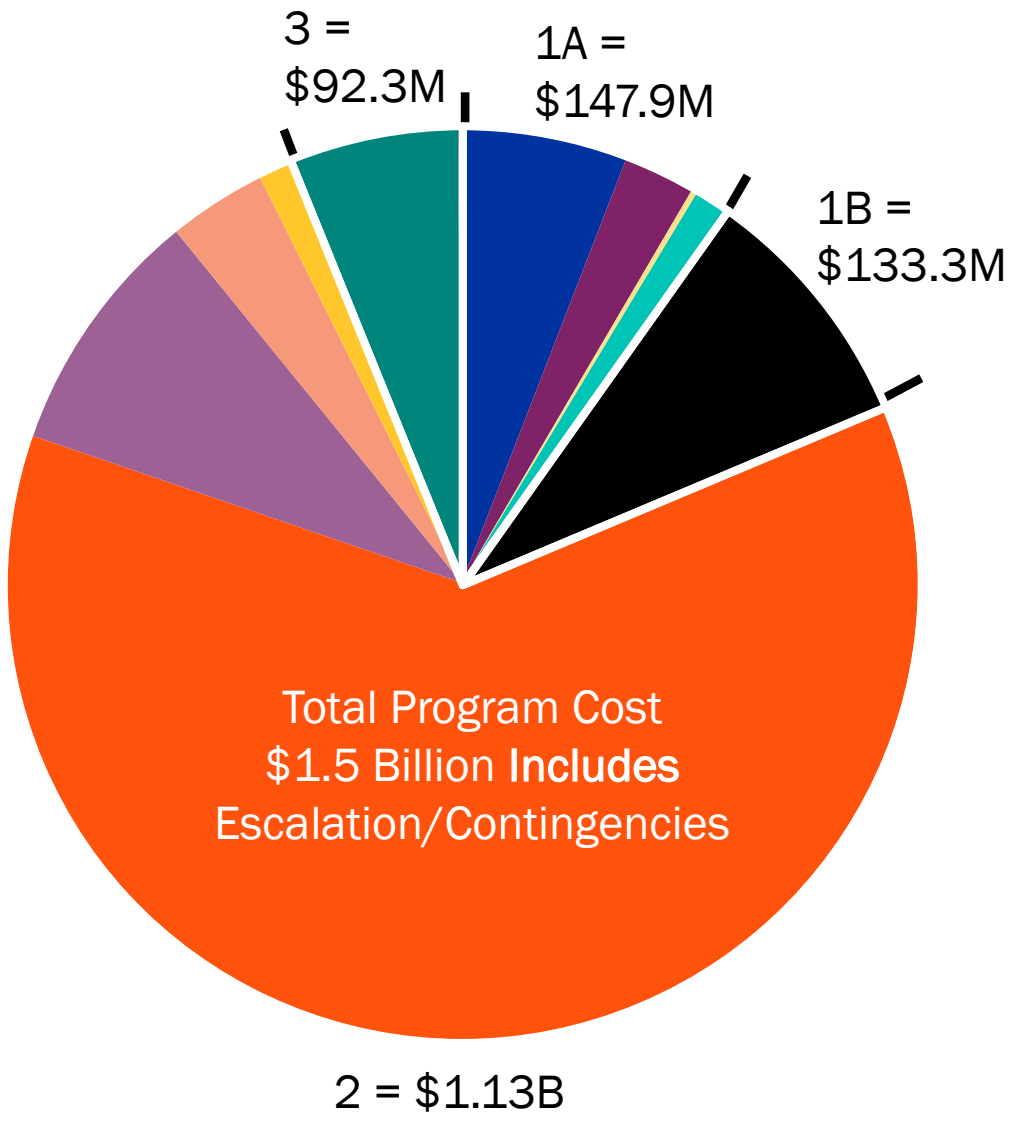
## PRIORITY 3



Priority 3 enhances educational and support services for the students and improve efficiency

# Overall Costs by Priority Categories

| | $2024$ | PRIORITY |
|---|---|---|
| Interior Modernization/New Construction | $ 697,436,473 | 2 |
| HVAC | $ 35,029,059 | |
| Site Improvements | $ 97,610,982 | |
| Misc. Deferred Maintenance | $ 9,236,899 | |
| Building Envelope | $ 57,226,594 | 1A |
| Building/Utility Services | $ 13,330,023 | |
| Classroom Technology/Infrastructure | $ 28,842,335 | |
| ADA, Equitable Access, Softball Fields | $ 100,211,746 | 1B |
| Enhanced Learning and Support Services | $ 67,971,027 | 3 |
| Portable Removal | $ 1,419,502 | |



# Q&A

- Questions?

Human by Design



# Burbank Unified School District

# 2023 Facilities Master Plan



# 1.0 |

# Introduction

Burbank Unified School District

Project Timeline

Project Tasks

Potential Fund Sources

# Burbank Unified School District

## Overview of BUSD

The Burbank Unified School District (BUSD) is an educational institution located in Burbank, California. BUSD offers a comprehensive educational experience from early childhood through high school. Committed to academic excellence, BUSD emphasizes rigorous curricula and programs that nurture the intellectual, social, and emotional development of students at various stages of their academic journey. The district upholds high standards in teaching and learning, supporting a range of extracurricular activities, including sports, arts, and clubs, to enrich the overall educational experience. These activities contribute to students' holistic development and provide opportunities for exploring interests beyond the classroom.

BUSD actively engages with the local community, recognizing the importance of collaboration among schools, families, and the broader community in fostering student success. Community involvement is encouraged through events, parent-teacher associations, and other initiatives. Despite challenges, such as changes in enrollment, evolving educational needs, and external factors, the district exhibits adaptability and strategic planning to effectively address these issues.

### Why is A Facilities Master Plan Needed?

The Burbank Unified School District (BUSD) was founded in the early 1900s. In the 1950s, the district secured its first general obligation bond. 47 years later, Measure B (1997), a $112.5 million facility bond, was successfully passed, and, 16 years after that, Measure S (2013), a $110 million bond, gained voter approval. These recent bonds have funded critical infrastructure projects, including roof replacements and mechanical system upgrades, and the most recent bond addressed significant technology upgrades, energy efficiency initiatives, and safety enhancements, such as fencing and new play structures.

While BUSD's facilities have been well maintained, investments made a generation ago, including roofs, HVAC systems, and utility infrastructure, are now reaching the end of their usable life and should be replaced to ensure a healthy learning environments for students and staff. Recognizing this ongoing need for facility improvements, the State of California provides funding matches every 25 years between each modernization project. Today, the needs of BUSD's school sites differ significantly from when the schools were originally built—80, 90, and, in some cases, 100 years ago. This Facilities Master Plan enables BUSD to identify and prioritize needs to enhance the quality of school facilities and better support the district's goals into the future.

On November 18, 2022, BUSD issued a Request for Proposal (RFP) to solicit proposals from qualified firms for the development of a District-wide Facilities Master Plan. On February 2, 2023, Perkins Eastman Architects, PDC, was awarded the contract.

A comprehensive Facilities Master Plan (FMP) is an essential component of a district's planning process. This FMP aims to provide the District with information regarding current and future needs to maintain the quality of existing facilities and address the evolving needs of students and staff.



## What is a Master Plan?

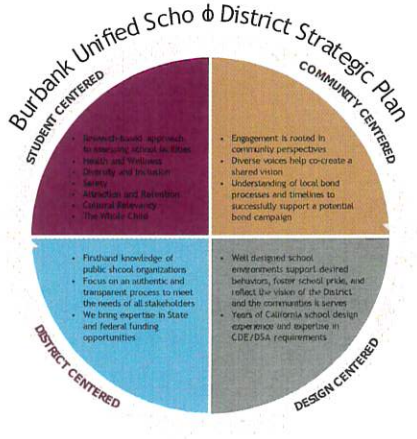
**"A facilities master plan is a document describing a strategy to address the need for facility improvements and for capital investments to support current and future educational goals." –Creating Connections, The CEFPI guide for Educational Facility Planning**

This Facilities Master Plan will furnish the District with comprehensive insights into current and future needs to ensure the quality of existing facilities and accommodate the varied and changing needs of students and staff. The document will serve as a roadmap for facility investments over the next 10-15 years.

Informed by community input, evaluations of each school site, and the District's strategic objectives, the Plan will identify needs and potential projects aimed at enhancing outcomes for Burbank's students and educators. Furthermore, the FMP proposes an initial project prioritization framework to assist BUSD in selecting projects for early pursuit. Anchored on established principles, this framework aligns facilities with the needs of school communities, improves student safety and wellness, and optimizes the utilization of state funding and other financial resources for maximum impact.

The goal of the FMP is to align the school buildings with the district's educational program and enrollment projection needs in a financially responsible manner. It considers the following factors:

1. The impact of the District's demographic enrollment projections on existing facilities and school capacities.
2. The educational program vision and student support services that inform the size of spaces, amenities, clustering of programs/services, placement on campus, and infrastructure needs.
3. Ensuring the educational adequacy of facilities using a high-performance learning environment benchmark.
4. Conducting facility condition assessments to evaluate existing building and campus infrastructure elements, including roofing, mechanical systems, exterior building envelope, and utilities.
5. Exploring funding options, including current state modernization and new construction eligibility, as well as other local funding sources, with scenario opportunities for potential proposed projects.



# Project Timeline

## FEBRUARY 2023

| | |
|---|---|
| Steering Committee Meeting | Feb 14 |
| Project Kick-off Meeting | Feb 14 |
| Data Collection Begins | Feb 14 |

## MARCH

| | |
|---|---|
| Mar 14 | Steering Committee Meetings |
| Mar 16 | Department Interviews |
| Mar 16 | Data Collection Ends |

## APRIL

| | |
|---|---|
| Steering Committee Meetings | April 6, 24 |
| Principal Interview/PE Site Walks | April 17-20 |
| Board Member Interviews | April 23-24 |
| Site Plans/Capacity Begins | April 6 |

## MAY

| | |
|---|---|
| May 3 | Family Service Agency Interview |
| May 4 | Steering Committee Meetings |
| May 10 | BTA Representative Interview |
| May 1 | Demographics Begins |
| May 31 | Site Plans/Capacity Ends |

## JUNE

| | |
|---|---|
| Principal Interview/PE Site Walks | June 1 |
| Steering Committee Meetings | June 1, 15, 29 |
| AECOM Site Walks | June 1, 7, 20, 26-30 |

## JULY

| | |
|---|---|
| July 13, 27 | Steering Committee Meetings |
| July 12-14 | AECOM Site Walks |
| July 28 | Demographics Ends |

## AUGUST

| | |
|---|---|
| Steering Committee Meetings | August 10, 24, 29 |
| Educational Specifications Meeting | August 17 |
| Community Engagement Begins | August 1 |
| Rom Cost & State Funding Begins | August 1 |

## SEPTEMBER

| | |
|---|---|
| September 7 | Steering Committee Meetings |
| September 14 | Administrative Affair Committee |
| September 21 | Board Presentation |
| September 1 | Ed Specs/Instructional Begins |

## OCTOBER

| | |
|---|---|
| Administrative Affair Committee | October 12 |
| Steering Committee Meetings | October 19 |
| Town Hall | October 26 |
| Master Plan Document Begins | October 30 |
| Community Engagement Ends | October 12 |

## NOVEMBER

| | |
|---|---|
| November 30 | Ed Specs/Instructional Ends |

## DECEMBER

| | |
|---|---|
| Steering Committee Meetings | December 14 |

## JANUARY 2024

| | |
|---|---|
| January 4, 25 | Steering Committee Meetings |
| January 18 | Board Presentation |
| January 29 | Master Plan Document Ends |

## FEBRUARY

| | |
|---|---|
| Board Presentation | Feb 15 |

# Project Tasks

The FMP scope of work includes the following tasks:

1. Conduct engagement sessions to define the FMP Guiding Principles and gather information about BUSD. Refer to page 20 for Guiding Principles and section 3.0 for engagement results.
2. Document the educational programming studies, updated District standards, and educational adequacy assessments by Campus. Refer to pages 28-29 and Appendix A.
3. Conduct a facilities needs assessment at all schools. Refer to pages 28-29.
4. Generate 10-year demographic enrollment projections. Refer to pages 21-24 for an overview and Appendix C.
5. Calculate current school capacities. Refer to pages 25-27 and Appendix D.
6. Determine State funding eligibility. Refer to pages 10-1 for an overview and Appendix H.
7. Identify existing campus uses and potential proposed improvements. Refer to Appendix G.
8. Create an initial project prioritization framework. Refer to pages 42-43.
9. Generate cost estimates. Refer to page 46.

# Potential Funding Sources

## Board of Education Consideration of a Facilities General Obligation Bond

At the Board of Education (BOE) meeting on November 2, 2023, there was discussion and potential action taken on a potential facility general obligation bond measure. The history of this matter traces back to prior BOE discussions:

At the August 17, 2023 BOE meeting, it was requested that the discussion of a facilities bond be added to a future agenda.

On September 7, 2023, the Board received a report from District staff detailing the 1997 and 2013 facility bond rates and the imminent completion of the 1997 bond repayment.

At the September 7, 2023 BOE meeting, the Board directed District staff to develop a timeline for the exploration of a potential facility bond measure on the March 2024 ballot.

On September 21, 2023, District staff presented a timeline to the Board, keeping open the possibility of a March 2024 facility bond for further consideration. The Board approved hiring Isom Advisors to conduct a survey gauging community sentiment toward the District and the possibility of a tax rate extension to invest in school facilities and technology.

On October 5, 2023, Isom Advisors presented their polling findings to the Board. Over the course of five days (Sept. 22–27), Isom Advisors called approximately 4,000 voters in Burbank; 400 registered voters participated in the survey, with 64.2% expressing support for a possible Bond measure in 2024. At the conclusion of this meeting, the Board directed District staff to meet with distric and community stakeholders to gather additional data points to inform their analysis. This analysis would help to determine whether to consider a bond or parcel tax, the timing of a potential election in March or November, and rate extension thresholds.

Two options were presented for the potential rate extension of the 2013 Measure S bond rate:

Option I maintains the 2013 voter-approved rate at $55.18, generating approximately $450M.

Option II maintains the 2013 voter-approved reduced rate at $50.00, generating approximately $350M.

Following the presentation on November 2, 2023, the BOE decided to continue community conversations around the bond and pursue placing a bond on the ballot in November 2024 instead of March 2024.

BUSD last participated in the State School Facility Program (SFP) in 2022. With the recently proposed general fund allocation of $2B for the 2023-2024 state budget and the potential for a 2024 State Bond Initiative, the district is well-positioned to apply for potential state matching dollars over the next several years.

**MODERNIZATION ELIGIBILITY SUMMARY**

The SFP Modernization Eligibility Report estimates that BUSD may currently apply for up to $17,259,524 in remaining modernization eligibility at twenty (20) school sites with eligible DSA approved projects. This figure assumes the district would match a contribution of $11,529,362, which represents a total State Project amount of $28,788,886.

**NEW CONSTRUCTION ELIGIBILITY SUMMARY**

This SFP New Construction Eligibility Report estimates that BUSD may currently apply for up to $5,776,609 in New Construction Funding. The New Construction Eligibility is determined using the 2022/2023 CBEDS Enrollment on a District-wide basis and projects the estimated number of unhoused pupils based on the OPSC enrollment projection methodology. This program is a 50/50 match program, which would require BUSD to match the additional $5,776,609 for a total project grant funding of $11,553,218.

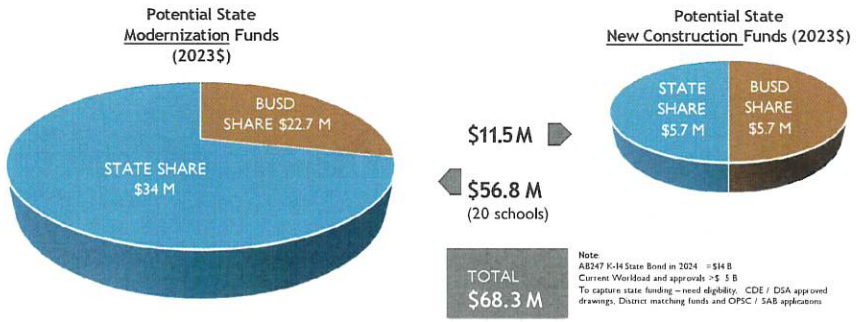



Fig.1.1 Potential modernization funds and new construction funds

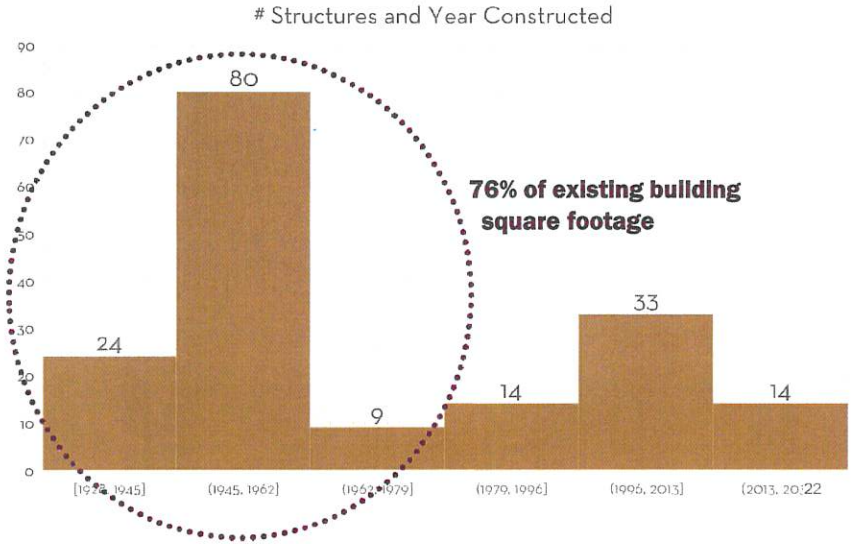



Fig.2.2 Average age of BUSD facilities

## Planning Philosophy

Perkins Eastman employs an integrated Facilities Master Plan (FMP) philosophy centered around four key themes.

First, it prioritizes a **student-centered** approach, leveraging research to shape facility and grounds criteria that emphasize the well-being and overall outcomes of students, considering their holistic needs.

Second, it advocates a **community-centered** approach, engaging the community to understand their unique vision for BUSD, which contributes to the development of planning guiding principles.

Third, it embraces a **district-centered** approach by involving BUSD experts familiar with school districts to provide a comprehensive perspective.

Last, it incorporates a **design-centered** approach, involving architects and learning environment planners with knowledge of California's educational requirements, facilitating the creation of innovative and engaging planning recommendations tailored to the specific needs of each school community.

Perkins Eastman's recommendations for building and site enhancements are grounded in a data-driven methodology and aligned with BUSD's guiding principles.

### Modernizations & Improvements

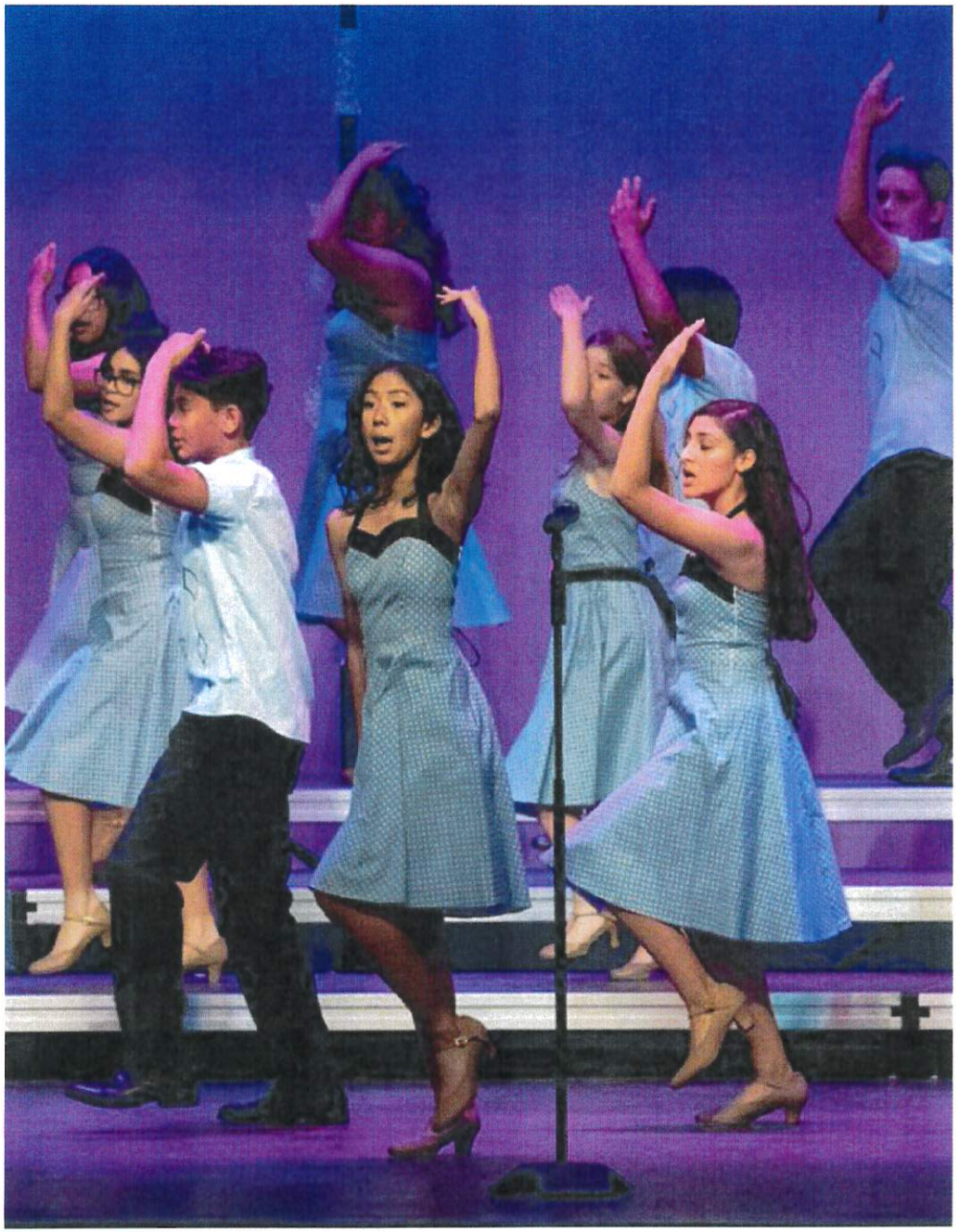
Modernizing aging facilities and improving deficient buildings (e.g., improving accessibly, seismic performance, indoor environment quality).

### Alignment of Physical Spaces & Program

Constructing or modifying buildings to align with demographic enrollment projections, pedagogy, program, and school community needs.

### Optimize Operations

Investing in facilities to improve operations, such as food systems, energy efficiency, and transportation.



# 2.0

# Overview and Process

Facilities Overview

Planning Guiding Principles

Enrollment Overview

Programmatic Capacity

Utilization

Educational Adequacy Assessment

# Facilities Overview

## Number of BUSD Schools

There are 11 elementary schools, 3 middle schools, and 3 high schools at Burbank Unified School District.

## Other Facilites and Alternative Schools

The District includes an adult school, children's center, community day school, Independent Learning Academy, and special education school. The District also owns a rental property, maintains a District office, and operates a maintenance and operations facility.

## District Boundaries

The following maps show the student attendance boundaries for the neighborhood elementary, middle and high schools in BUSD.

**17**

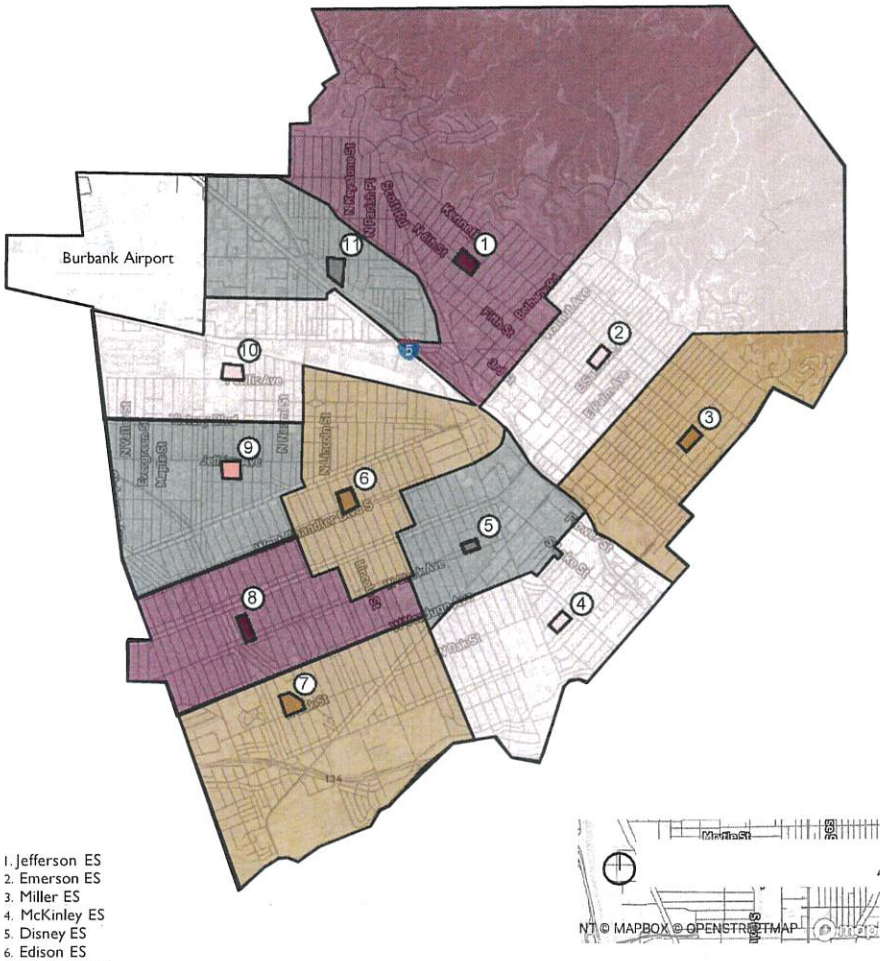
***elementary, middle and high schools***

**8**

***other facilities and alternative schools***

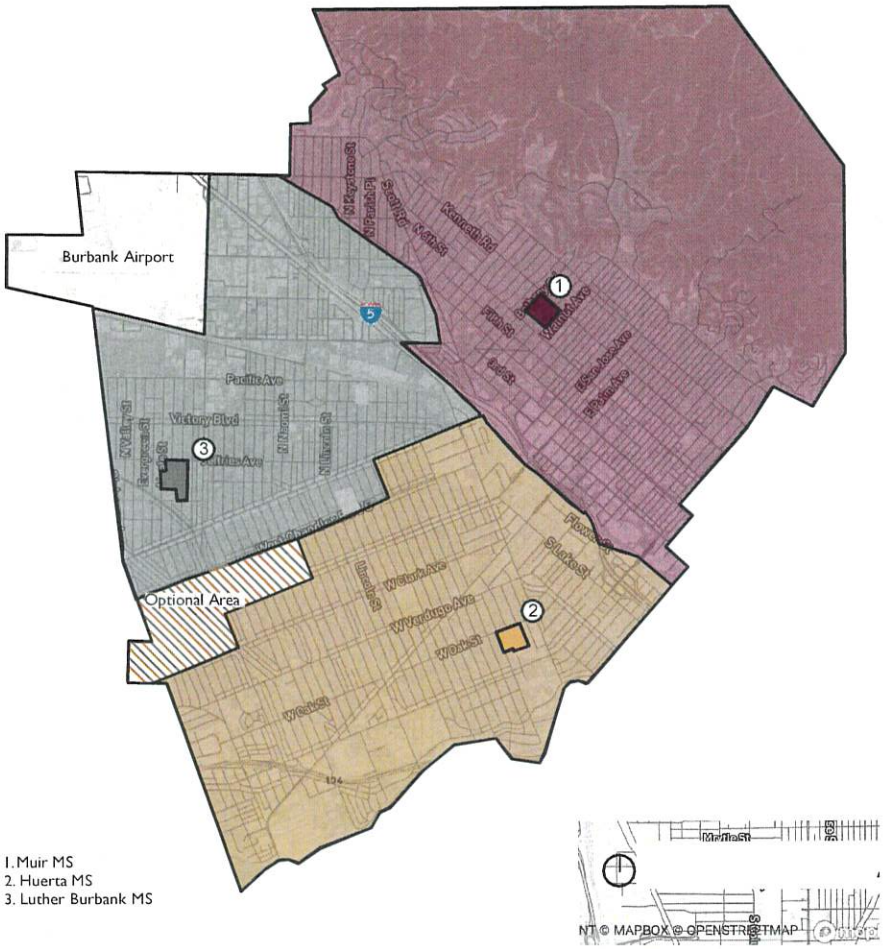


## Elementary School Boundaries



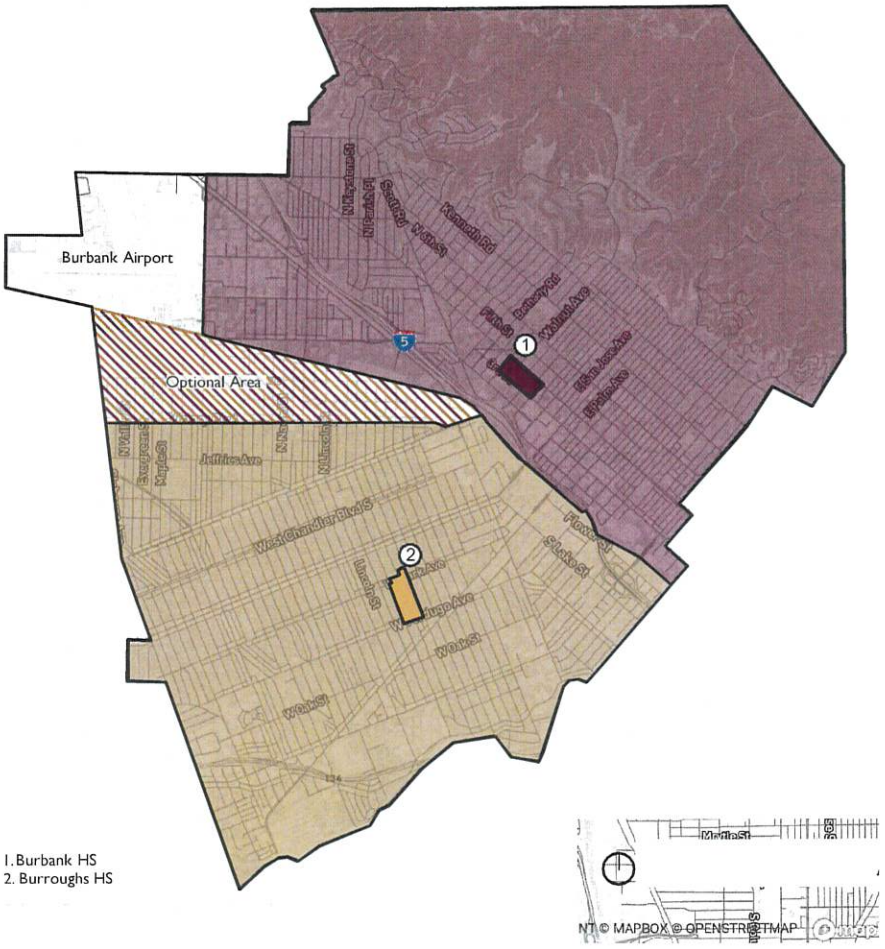

1. Jefferson ES
2. Emerson ES
3. Miller ES
4. McKinley ES
5. Disney ES
6. Edison ES
7. Stevenson ES
8. Roosevelt ES
9. Bret Harte ES
10. Providencia ES
11. Washington ES

## Middle School Boundaries




1. Muir MS
2. Huerta MS
3. Luther Burbank MS

## High School Boundaries




1. Burbank HS
2. Burroughs HS

# Planning Guiding Principles

## Process

Developed through engagement with District leadership and school stakeholders, these guiding principles will steer the planning process and shape the identification of needs and projects. The BUSD Local Control and Accountability Plan (LCAP) was also consulted to align its goals and actions with those listed below. The district-wide goals for 2022-2023 are aligned with these guiding principles.

## Planning Guiding Principles

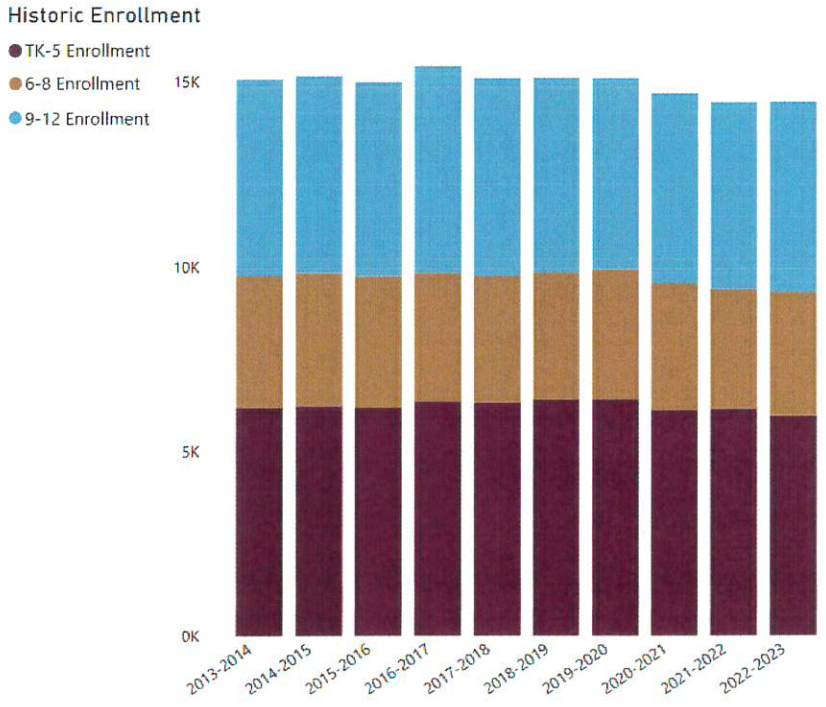
- Create **safe** schools that provide a **secure** environment for students, staff, and familes.
- Ensure every student has access to **high-quality learning environments** equipped with **state-of-the-art technology** that supports **innovative pathways** for success.
- Make **smart and efficient investments** to modernize and maintain buildings, grounds, and infrastructure.
- **Recruit and retain** high-quality employees.
- Support the physical, emotional, and mental **wellness** of each student and staff member.
- Provide superlative **art creation and performance** spaces that align with Burbank's premier arts programs.
- Invest in a **sustainable** future for Burbank's students; ensure **resiliency** against future environmental shocks.
- Provide resources **equitably** to support programs that promote **diverse and inclusive** school communities.




# Enrollment Overview

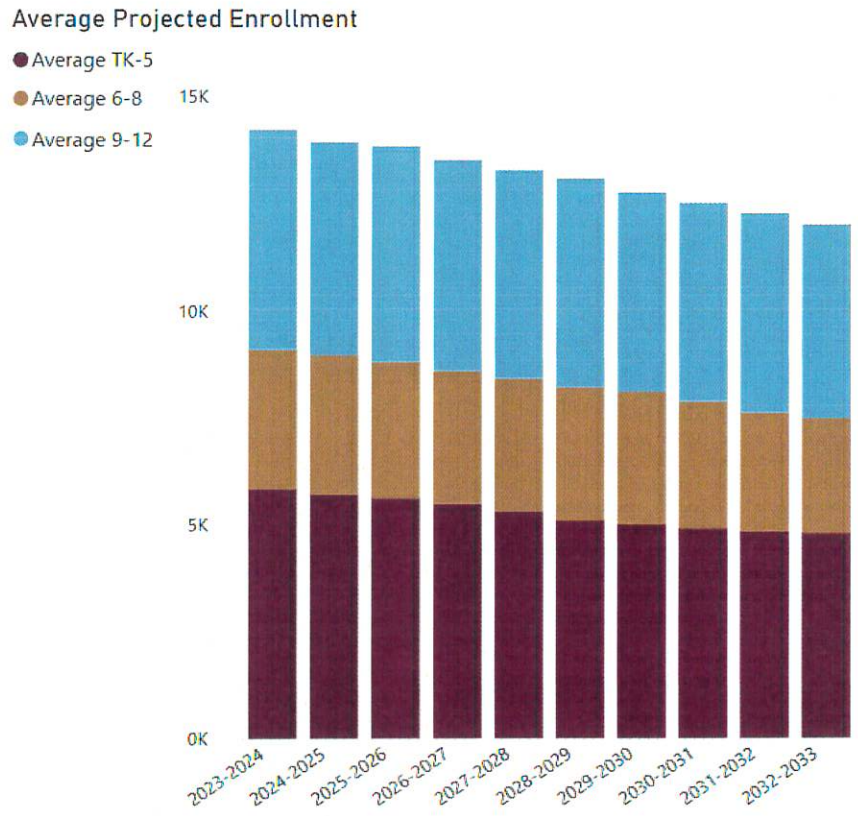
## 2013-2023 Enrollment

Burbank Unified School District has experienced consistent and steady enrollment throughout its history, reflecting the District's appeal and commitment to quality education. However, enrollment in 2020 deviated from the typical pattern observed in previous years.



## 2023-2033 Enrollment

Projections for the next decade indicate a notable decline in enrollment at Burbank Unified School District. Various factors contribute to this anticipated decrease, including demographic shifts, economic considerations, and evolving educational preferences.




## Enrollment

Demographically, the region served by the District may witness a decline in the school-aged population due to factors such as lower birth rates or outward migration of families. Economic factors, including job opportunities and housing costs, may influence family decisions, potentially resulting in a decrease in the number of students attending the District's schools.

Enrollment has experienced an average annual decline of 0.39% since the 2013 school year, with only two years showing positive year-over-year changes. Baseline forecasts were prepared for 3-, 5-, and 8-year retention rates. Each retention rate model was calibrated to account for various future birth rate scenarios, including a continuing downward trend, stabilization at 2021 levels, or a potential turnaround. Ultimately, the selected model reflects 5-year retention with stabilized birth rates.

Furthermore, shifts in educational preferences and the rise of alternative learning models, such as online education or homeschooling, may contribute to a shift away from traditional public schooling. Families seeking greater flexibility or specific educational approaches may explore non-traditional options, impacting enrollment numbers at traditional public schools.

The district's response to these trends will be crucial in mitigating the impact of declining enrollment. Proactive measures, such as the implementation of innovative educational programs, community engagement initiatives, and targeted marketing efforts, can help address the challenges posed by decreasing enrollment and position the district for long-term sustainability.

In summary, the anticipated decline in enrollment at Burbank Unified School District over the next decade reflects a complex interplay of demographic, economic, and educational factors. Adapting to these changes will necessitate strategic planning and a commitment to providing an educational experience that aligns with the evolving needs of the community.

## Birthrates

Over the past few decades, the United States has experienced a discernible decline in birth rates, influenced by a complex interplay of social, economic, and cultural factors. Anticipated decreases in birth rates over the next decade in Burbank and California may be attributed to similar factors. It is essential to acknowledge that projections of birth rates are subject to change based on evolving societal dynamics, economic conditions, and policy interventions.

The population in Burbank, Los Angeles County, and the nation as a whole is aging:

- The median age in Los Angeles County increased from 34.8 to 37.5 between 2010 and 2020.
- The median age in Burbank increased from 38.9 to 40.4.
- The median age for women surpasses that of the overall population, with a median age of 38.7 in Los Angeles County and 41.4 in Burbank in 2020.

The number of new births significantly influences enrollment forecasts, and the birth rate has been declining in Burbank and Los Angeles County since the early 1990s.

The construction of new housing can have a net positive impact on public school enrollment. Currently, there are 2,906 units with approved or pending entitlements for construction in the next 5 years. Additionally, there is potential for another 9,239 units under as-of-right development, according to the 2022 City of Burbank Housing Element. Due to the uncertainty of potential housing implementation, only projects with approved or pending entitlements were included in the planning projections.

Applying customized Public Use Microdata Sample multipliers of school child generation by housing type, tenure, and the number of bedrooms, these new units would generate 392 children in units with entitlements, along with another 216 children from pending projects. The as-of-right projects could potentially generate as many as 1,693 children, but without proposals, they are unlikely to impact the 10-year forecasts.

## Demographics

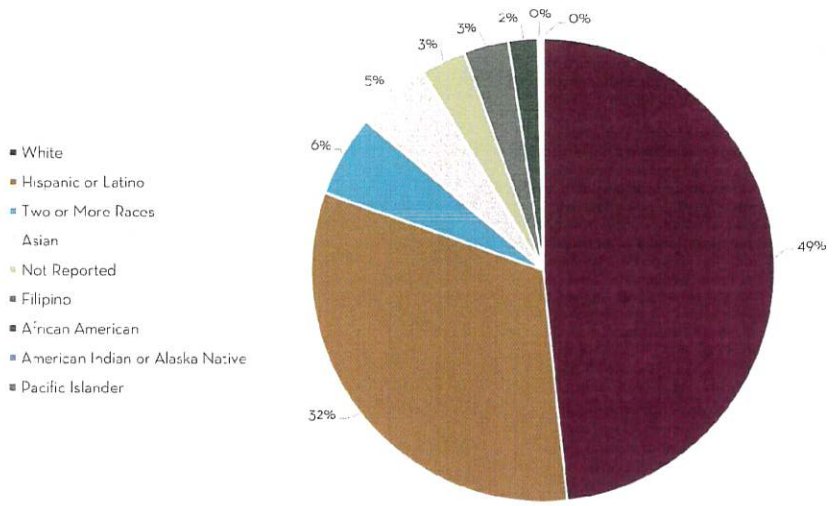



Fig.2.1 BUSD Demographics

Burbank is known for its cultural diversity, boasting a population that includes individuals from various ethnic backgrounds, contributing to a vibrant and multicultural community. This diversity is reflected in the city's social fabric, cuisine, and cultural events.

The demographic composition of Burbank is diverse in terms of age, with residents spanning various age groups, including young families, working professionals, and retirees.

Given its proximity to Los Angeles and its reputation as an entertainment industry hub, Burbank's population exhibits a wide range of educational backgrounds, with many individuals holding higher education degrees, notably in fields related to media and entertainment.

Enrollment projections for the District are driven by cohort-survival demographic projections adjusted by grade-by-grade retention rates, which identify mobility between grades. Similar projections have been made for each school, with further review to adjust for enrollment choices (refer to the appendix).

Burbank features both affluent neighborhoods and areas with a more diverse socioeconomic mix. The housing landscape comprises a variety of residential properties, including single-family homes, apartments, and condominiums. The real estate market caters to a diverse range of housing needs.

Building upon the baseline forecasts, an analysis of housing and development trends in Burbank and the surrounding areas was conducted to assess their impact on enrollment, considering changes in demographics, settlement patterns, and development trends. For each attendance area, approved developments were geocoded to determine the number of new families. A Public Use Microdata Sample (PUMS) was prepared to cross-examine developments and determine likely public school child generation. The students from new developments were then integrated into the retention models to identify any potential strain on capacity.



# Programmatic Capacity

Programmatic capacity refers to BUSD's ability to accommodate the specific educational programs and activities offered at different schools.

In elementary school classrooms, programmatic capacity focuses on establishing a foundation for learning. These classrooms are designed to be vibrant, engaging, and adaptable to accommodate diverse teaching methods. Only classrooms designated for specific grade levels were categorized as loaded and included in the calculation of school capacities. Additionally, at elementary schools, certain non-loaded spaces are reserved and excluded from the capacity count. These spaces include:

1. STEAM/Maker Space Lab
2. Music Lab
3. Innovation Lab (formerly Computer Lab)
4. Teacher on Assignment (TOSA)/Professional Development (PD) Room
5. English Language Development (ELD)Room
6. Resource Specialist Room (RSP)
7. Response to Intervention (RTI) Room

## Loading Standards

For classroom loading standards, based on grade level and specialized use, the established guidelines, as per BUSD's Teacher Agreements, are as follows:

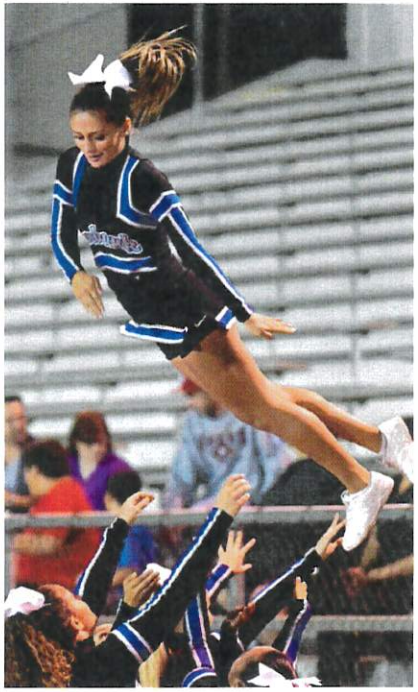
1. ELD: 20:1
2. SPED: 14:1
3. 6th-12th: 34:1
4. 4th-5th: 32:1
5. TK-3: 24:1

These standards play a crucial role in the planning and management of educational spaces within school districts. The goal is to ensure that classrooms provide an environment conducive to learning while maintaining the well-being and safety of students and educators. They contribute to the overall quality of education by ensuring that classrooms are well-suited to the needs of both students and educators.

Additionally, some schools sites may allocate the following non-loaded spaces, if their special education population requires these services:

1. Occupational Therapy (OT) Room
2. Physical Therapy (PT) Room
3. Large meeting room for IEP's.

At the high school and middle school levels, classrooms are designed to prepare students for more advanced studies, potential career paths, and increased independence. Programmatic capacity considerations at this level include treating elective classrooms as fully loaded spaces, factored into the calculation of the school capacities.



## Methodology

Calculating the programmatic capacity of a school's classrooms involves a comprehensive assessment of available space, considering factors such as room size, furniture arrangement, and the specific needs of educational programs. The methodology employed can vary based on the goals of the assessment and the type of programs offered by the school.

Perkins Eastman obtained Campus Evacuation Maps, school rosters, and/or the master schedule of courses at the high school grade levels from each school. This information served as a reference to document room uses, forming the basis for capacity calculations. Special Education and Before/After School program lists were provided to verify the placement of these programs for each school.

The methodology includes the following steps:

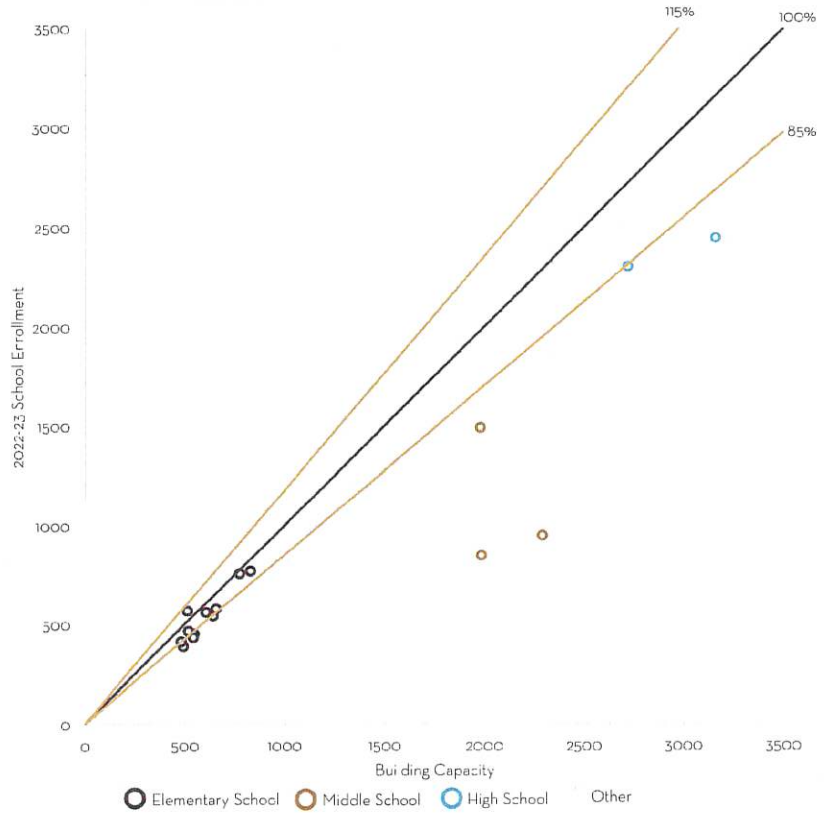
1. **Define Educational Programs**: Clearly outline the types of educational programs the school offers, including class sizes, special programs, and any unique requirements for different subjects or activities.
2. **Gather Information:** Collect detailed information about each classroom and determine how the space can be optimized for various types of educational activities.
3. **Account for Specialized Areas:** Assess the unique requirements of specialized areas and calculate their programmatic capacity accordingly.

By following this methodology, BUSD can gain insights into the capabilities of their classrooms, optimize space usage, and make informed decisions to support effective educational programs. Specific details of the methodology may vary depending on local regulations, educational standards, and the unique characteristics of the school.



# Utilization

## District-Wide Utilization




The District-wide utilization of classrooms reflects a comprehensive and strategic approach to optimize educational spaces across all schools within the district. The current enrollment shows a majority of elementary schools falling along the 100% line and high schools and middle schools falling below the 85% line. Non-loaded and loaded spaces are factored into these calculations, as outlined on the previous page.

# Educational Adequacy Assessment

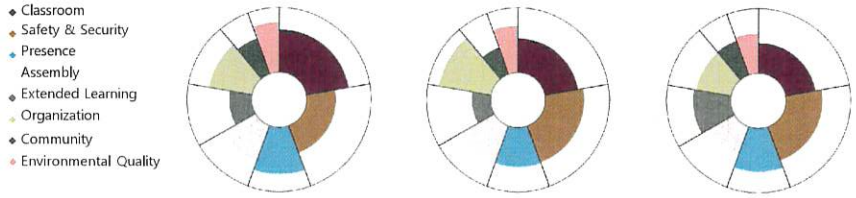



Fig.2.2 Shows from left to right the overall EA scores of elementary schools, middle schools and high schools at BUSD

**The collected data helps provide an overall Educa&#xfffd;onal Adequacy (EA) score for each facility at BUSD. This informa&#xfffd;on guides the iden&#xfffd;fica&#xfffd;on of areas for improvement to enhance teaching and learning environments, providing the greatest impact to health, wellness, and academic outcomes.**

Educational Adequacy (EA) assesses the ability of a school's design features and spaces, both interior and exterior, to support learning and teaching. It serves as a tool to pinpoint areas of improvement at both the District-wide and individual school levels. The EA assessment comprises 234 questions categorized into eight areas, each scored on a scale from 0 to 1. The categories include:

**Presence:** Evaluates how the building and grounds present themselves to the community, including the quality of the arrival experience for students and visitors.

**Safety & Security:** Assesses the school's safety and security, considering sight lines, transparency, program locations, and other "hard" and "soft" design elements that may enhance school safety.

**Community:** Assesses the school's role in fostering relationships and a sense of community within the school and across the surrounding community.

**Organization:** Evaluates the general positioning of spaces within the school, including the main office, spaces for faculty collaboration, and areas for various student activities.

**Instructional Space:** Assesses classrooms, science labs, and art studios on factors such as size, shape, furniture and fixtures, presentation and display opportunities, windows and views, connectivity to adjacent spaces, and elements that may contribute to a positive learning ambiance (e.g., color, finishes, infrastructure).

**Environmental Quality:** Assesses environmental factors, including acoustics, daylighting, thermal comfort, and indoor air quality.

**Assembly:** Assesses the quality of assembly spaces, such as auditoria and dining areas, considering the shape, size, furniture and fixtures, and elements that may contribute to a positive learning ambiance (e.g., color, finishes, infrastructure).

**Extended Learning:** Assesses informal spaces that supplement more formal spaces (i.e., classrooms or labs) based on the same factors used to assess instructional spaces.

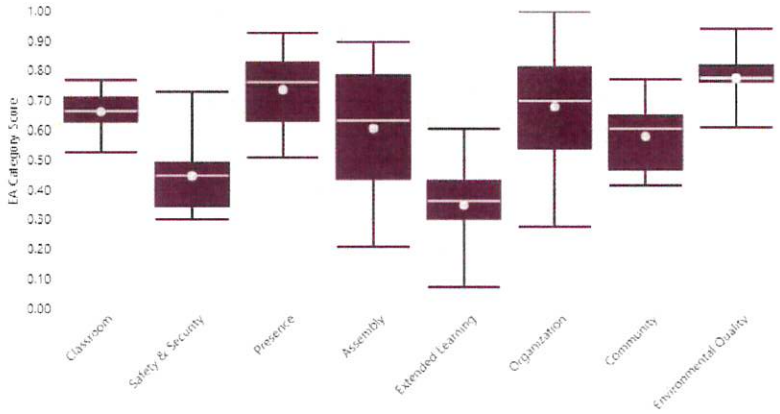



Fig.2.3 Elementary schools educational adequacy scores by category

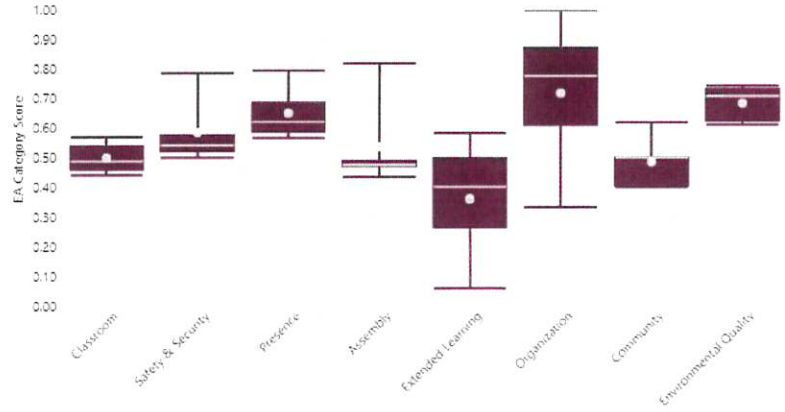



Fig.2.4 Secondary schools educational adequacy scores by category

The charts above depict each Educational Adequacy category from the site surveys at elementary and secondary education facilities. They highlight the range and average scores. The plots show that extended learning opportunities are lacking at both the secondary and elementary grades. Additionally, we see that the range of the data shows significant variation between schools for a lot of the categories, signaling varying levels of adequacy across the BUSD portfolio.

# 3.0 | Engagement

Engagement Opportunities

# Engagement Opportunities

## Survey Results

The purpose of the survey was to gather insights and preferences from the community, students, parents, teachers, and staff regarding the priorities for the Master Plan. The survey received 516 responses.

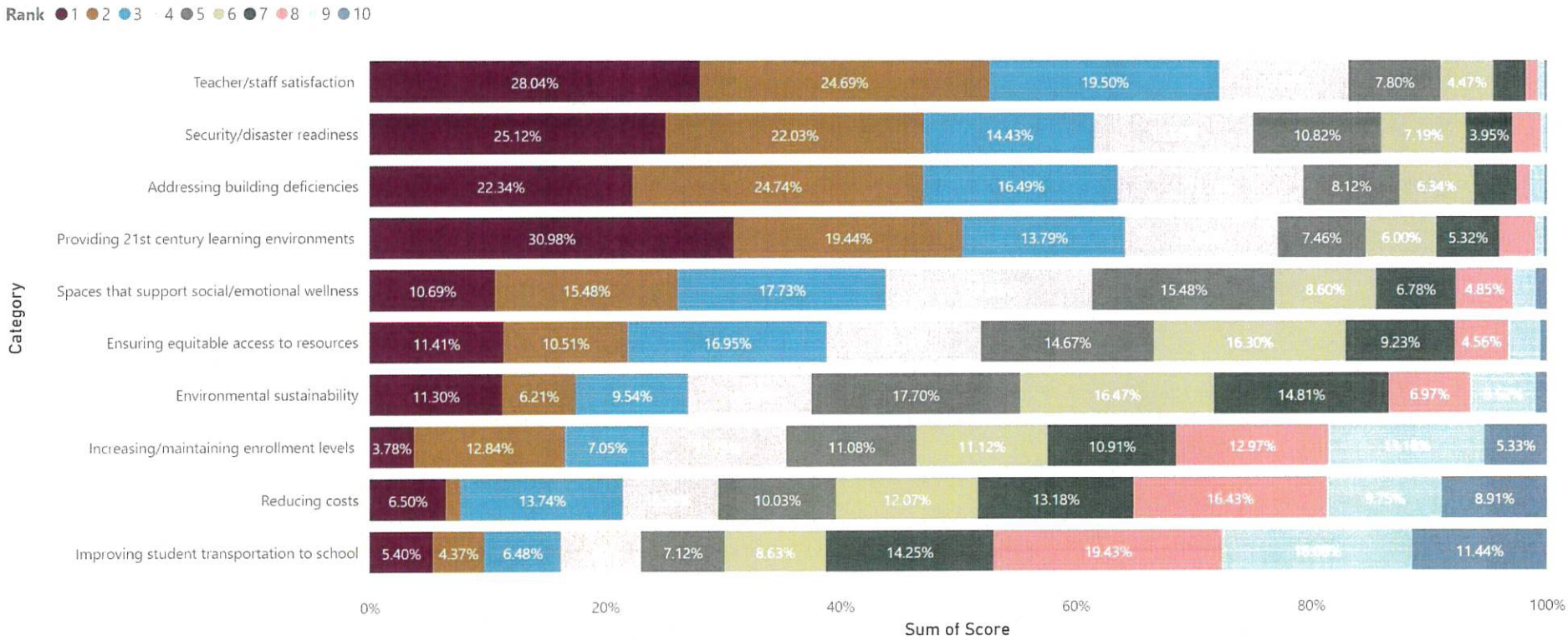
Participants prioritized the wellbeing and satisfaction of teachers and staff as the most crucial, highlighting the importance of fostering a positive working environment. Security and disaster readiness emerged as the second most significant concern, emphasizing the community's focus on safety and preparedness. Addressing building deficiencies was recognized as a key priority, underlining the need for infrastructure improvements.

**Survey Question:**

**Please rank these considerations in order of importance for this Master Plan (click and drag the options below to rank from 1to 10)**

**"The quality of education students receive, particularly when compared to surrounding districts was a differentiating factor that made BUSD stand out." –BUSD Community Member Survey Response**

**"The small, highly supportive community, high academic standards, broad academic & extracurricular opportunities." –BUSD Community Member Survey Response**



## Survey Results

The community overwhelmingly identified the creation of safer schools as the top priority, indicating a strong desire for measures ensuring the safety and wellbeing of students and staff. Modernizing classrooms ranked second, emphasizing the importance of providing a contemporary and technologically advanced learning environment. Having a clear and consistent vision was recognized as essential for the success of the Master Plan, underlining the community's expectation for transparent and cohesive planning.

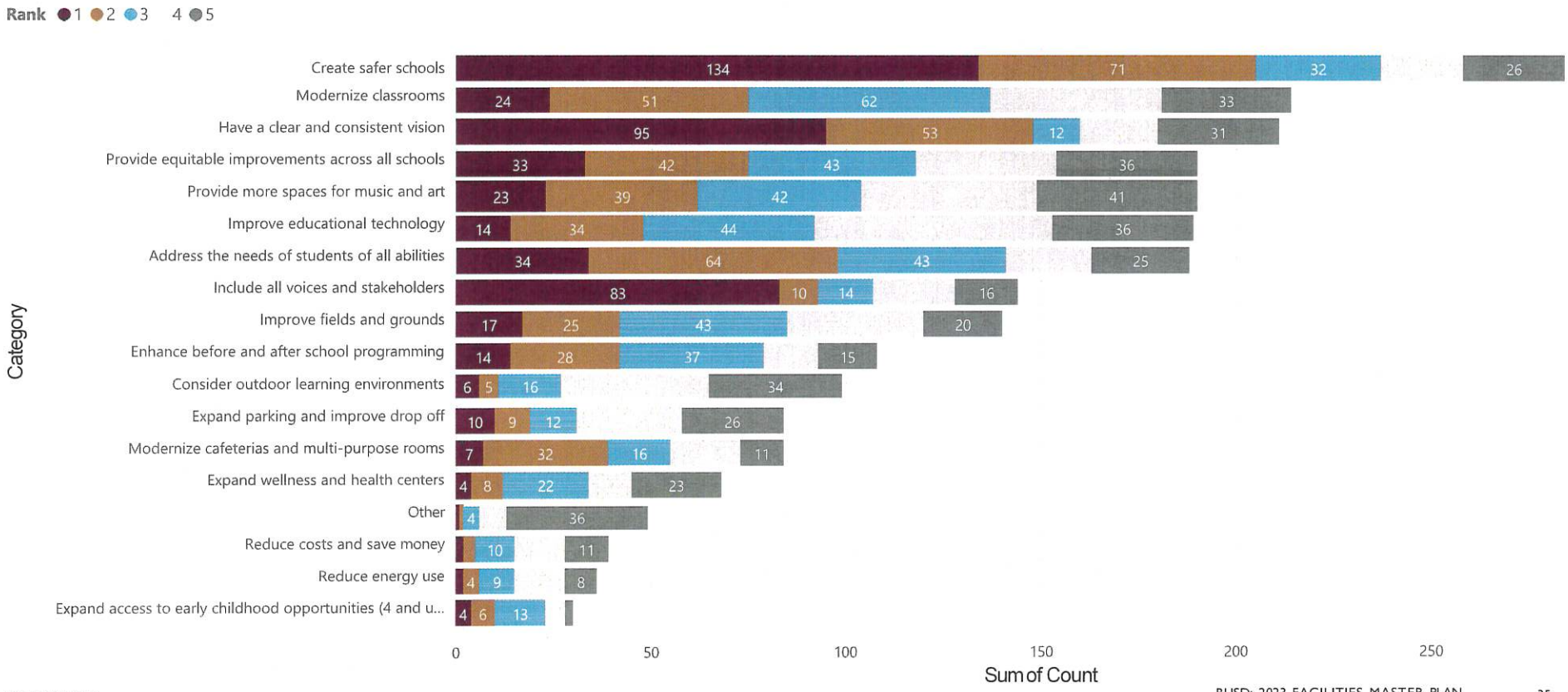
While participants had the option to select up to five choices for the survey questions, it is important to note that not all respondents utilized the full extent of their choices. Consequently, the data may be somewhat skewed, and interpretations should consider the variability in response patterns.

**Survey Question:**

**This Facilities Master Plan will not be a success if it does not ____?(Please choose 5.)**

**"The community is tight knit and they truly care about ALL of the schools, not just the ones they are zoned for. If they aren't all succeeding, the community works together to raise each school up." –BUSD Community Member Survey Response**

**"Having equal opportunities for all students in the district." –BUSD Community Member Survey Response**



## Administrative Affairs Committee





Two separate meetings were held with the Administrative Affairs Committee to discuss the Master Plan.

### Meeting 1: Introduction and Needs Assessment

The first meeting with the Administrative Affairs Committee presented key topics related to the development of the District's Master Plan. The committee comprised dedicated administrators, students, teachers, and board members.

The kickoff entailed a comprehensive overview of what a master plan entails, a review of our schedule, an overview of the guiding principles, and a group exercise. Visual aids, including charts and diagrams, helped to effectively illustrate key points. The presentation delved into demographic shifts, enrollment trends, and the evolving needs of students and educators.

The committee actively engaged in a robust discussion about the existing infrastructure, addressing concerns and highlighting areas in need of attention. This initial meeting aimed to foster a shared understanding of challenges and opportunities, laying the foundation for the development of a forward-looking Master Plan.

### Meeting 2: Proposed Solutions and Future Vision

In the subsequent meeting, a set of proposed solutions and a vision for the future were presented. Building upon the insights gathered in the first meeting, strategic initiatives were outlined to address current shortcomings and position the district for future success.

The Master Plan considers technological advancements, sustainability goals, and the importance of creating flexible spaces that can adapt to various educational methodologies. The committee responded with enthusiasm to the proposed solutions, offering valuable feedback and posing insightful questions.

Topics discussed included:

- Creating safe schools that provide a secure environment for students, staff, and families.
- Ensuring every student has access to high-quality learning environments equipped with state-of-the-art technology that supports innovative pathways for success.
- Making smart and efficient investments to modernize and maintain buildings, grounds, and infrastructure.
- Recruiting and retaining high-quality employees.
- Supporting the physical, emotional, and mental wellness of each student and staff member.
- Providing exceptional spaces for art creation and performances, aligning with Burbank's premier arts programs.
- Equitably allocating resources to support programs that promoting diverse and inclusive school communities.
- Investing in a sustainable future for Burbank's students to ensure resiliency against future environmental shocks.






# Leadership Interviews Summarized

The following summarizes key findings from the department and principal interviews, which were held during the early phase of this project.

### Administrative Services

- Aging Infrastructure Issues – Addressing leaking roofs, kitchen without AC, poor lighting, total HVAC upgrades, sustainability initiatives to extend the life of facilities, and implementing proactive maintenance programs.
- Systems – Implementing low-cost thumb turns for teachers to lock doors from the inside, securing gates and establishing single entry points to every facility, and installing cameras for surveillance footage in case of an incident.
- Priorities – Prioritizing improvements to food service areas, ensuring up-to-date facilities.

### Education Services

- Security access through gates poses a security risk.
- The District is a significant draw for students on permit, necessitating annual review of permits; this is particularly impactful for Visual and Performing Arts programs and dual immersion
- High school softball fields are needed to address Title IX requirements.
- Science labs are not properly sized to meet the course load.

### Athletic Directors

- The District lacks a softball field.
- More space is needed in the gym for training rooms.
- Need areas dedicated for visiting team meetings.

### Family Services Agency

- Goals – Aiming for on-campus presence 2-3 days a week, incorporating a loft and stairs at Burroughs.
- Ideal parameters for Special Education support include individual and group counseling spaces (rooms measuring 10ft x 10ft or 12ft x 12ft) available at every site
- There is a need for wellness centers at each site to better support long-standing, effective outcomes resulting from the BUSD/FSA partnership.
- Evaluating the costs associated with expanding wellness centers at middle schools.

### Information Technology Division

- A unified communications system, such as a VOIP telephone, is needed.
- Network support is needed, including the installation of fiber between high schools, direct connections, and server upgrades.
- Upgrades are needed for all classroom AV systems; and student/staff devices need a refresh.
- Upgrades are required for the Data Center.

### Food Services

- School Kitchen Needs – Addressing various issues with serving students and dining at elementary school sites (e.g., Disney, Miller), including the need for a three-compartment sink and clarification on utilities plans adding meal handoff lines.
- Huerta and Luther need long-term goals for potential central kitchen consolidation. (Note: This scope is not included in the FMP, but modernization costs have been applied to each space.)



# Leadership Interviews Summarized

### Burbank Teachers Association

- Facility Concerns – Addressing issues, such as leaking HVAC systems, leaking roofs, distracting heaters and fans, the need for better AC systems, moisture from leaks, and an unhealthy environment.
- Security – Addressing concerns, such as doors to campus locking from the outside and requests to cover windows to the corridor, and evaluating campus access points

### Superintendent

- Classroom furniture is outdated with limited ability to reconfigure spaces to support collaboration.
- Need for additional areas for eating and outdoor shade for students.
- Improvement is needed for staff areas, including provision of separate spaces for lounge and workrooms.

### Board Member Weisberg

- Amplify voices which may not be heard: prioritize doing the right thing even if it's not the popular choice.
- Address the concern of needing to improve competitive compensation
- Connect with city councils to discuss affordable housing and educational housing.

### Board Member Pontzer Kamkar

- Focus on optimizing the impact of instructional space.
- Address the issue of losing people to Glendale due to dual immersion programs and school day schedules.
- Recognize the need for more after-school programs to prevent parents from turning to private options, leading to increased retention.

### Board Member Tabet

- Libraries are not properly utilized and are antiquated.
- CTE and NAF programs are extraordinary and have a lot of community support.
- Address Title IX concerns regarding the softball fields and facilities in the master plan.

### District Office

- Five years ago, the floor sank ½inch, and the issue is recurring. Pillars are twisting at tops, and carpets are dropping. Alcove walls are cracking and separating. Plumbing problems persist, as drains and pipes were not installed correctly, leading to frequent clogs.
- Consider consolidating to one building for efficiency and improved infrastructure management.

### Instructional Services Division

- Safety is a top priority, and the old layouts may not adequately serve today's security needs.
- Building conditions require attention, including restroom facilities, the need for inclusive restrooms, failing HVAC units, poor exterior lighting, and inadequate food service spaces. Cafeterias are missing in some schools, and additions are needed.
- Special Education programs need improvement, including dedicated spaces for children with specific needs. Resources are necessary at every school.
- While BUSD has strong CTE pathways at the high schools, there is a need for flexible spaces at the elementary level to facilitate project-based learning at earlier ages.

# 4.0 |

# Recommendations and Strategies

Recommendations

# Recommendations

## Process

Based on stakeholder input and the initial proposed prioritization framework, the following categories outline the potential project priorities at a district-wide scale. These projects may be implemented through new construction, existing facility modernizations, or targeted projects.

For school-specific information, please refer to the Site Profiles in Appendix G, which outlines specific projects identified for each site.

School-specific projects were identified through:

- Facility condition assessments
- Educational Adequacy evaluations
- School-wide observations
- Evaluation of projected school enrollment and demographic needs
- Input from both school and district perspectives

## Level 1A Priority

**Level 1A priorities are associated with site safety and infrastructure upgrades, which may include upgrades to:**

- **Safety and security;**
  - Perimeter fencing;
    - Replacing aged and damaged fencing and adding new fencing where needed to ensure each school has a safe perimeter.
  - Secure entry;
    - Building modifications to control access into the campus and require visitors to pass through a secure area before entry to the campus.
- **Technology network and communications;**
  - Replacing current IT infrastructure to ensure all campuses have modern connectivity and sound internal and external communications.
- **Fire & Life Safety;**
  - Replacing aged fire, alarm and sprinkler systems across the campus.
- **Exterior doors;**
  - Replacing aged and damaged doors that lead to the outside to ensure the campus perimeter is secure.
- **Core building requirements;**
- **Envelope;**
- **Roofing;**
- **Windows; and**
- **Utility services (sewer/electrical).**

## Level 1B Priority

**Level 1B priorities are associated with code upgrades and include:**

- **Equitable access:**
  - ADA accessibility;
    - Projects to ensure that the entire interior and exterior of the campus meets the Americans with Disabilities Act requirements.
  - Individual and single-user restrooms;
    - Adding single-user bathrooms to campuses to ensure equitable access to restroom facilities for all students, staff, and visitors.
  - Softball facilities at high schools
    - Adding dedicated softball facilities on campus at the two high schools for the female student athletes.

## Level 2 Priority

**Level 2 priorities focus around improving the learning environment, which may include the following upgrades to interior classrooms:**

- **Modernizing the learning environment:**
  - Interior finishes (e.g., flooring and casework);
    - Replacing existing dated finishes with modern and healthy materials. This includes flooring, ceiling, wall covering, and casework.
  - Furniture;
    - To improve the Educational Adequacy and functionality of the classrooms, replace older furniture with new flexible furniture that support multiple learning and instruction styles.
  - Educational technology
    - New classroom and learning technology to include computers and interactive boards and projectors.
- **Improving facility conditions:**
  - Heating, ventilation, air conditioning (HVAC);
    - Replace aged systems with new modern systems to improve occupant satisfaction and health and improve energy efficiency.
  - Lighting;
    - Replace existing electric lighting with LED lighting to improve room conditions and energy efficiency.
- **Improving the grounds and site conditions to reduce heat gain through hardscaping and landscaping:**
  - Adding shade structures;
    - To fully maximize the campus all school year and all day, adding additional shade structures will create additional learning and collaboration areas for students.
  - Lunch shelters;
    - Replacing aged and undersized lunch shelters ensure that students have a comfortable environment to eat and socialize with other students.
  - Outdoor classrooms
    - Building intentionally designed outdoor learning areas will extend the learning spaces beyond the tradition classrooms.

## Level 3 Priority

**Level 3 priorities enhance educational and support services for the students and improve efficiency; these may include:**

- **School program and space enhancements:**
  - Wellness/Learning Centers at elementary schools (expansion at some sites);
    - Adding and expanding wellness centers will create dedicated space to support the whole child through additional counselor offices, OT/PT rooms, psychologists, and other support providers.
  - Science Labs at middle and high schools;
    - Updating the middle and high school science labs will ensure that students have access to modern environments that support the latest requirements for science teaching and learning.
  - STEAM/Music spaces at elementary schools;
    - Design and construction of a dedicated STEAM and Music classrooms at each of the BUSD elementary schools to ensure that all students have access to the arts.
  - Visual and Performing Arts Improvements at MS and HS:
    - Dedicate funding to improve the current VAPA spaces at each of the secondary schools.
  - Library improvements;
    - Modernizing and often expanding the library spaces to become modern and flexible learning environments to support multiple uses ranging from full class instruction, small group collaboration, and individual learning.
  - Kitchen improvements updating food preparation and serving areas with new equipment and design to support healthy food initiatives.
- **Improving efficiency:**
  - Removing aging portables
    - Aged portables buildings provide inadequate learning environments and create maintenance and operational challenges. Because of the declining enrollment, many of the portables can be removed and not replaced.
  - Installing photovoltaic (PV) panels for power generation
    - Adding photo-voltaic (PV) panels above parking areas, lunch shelters, and shade structures will increase on site electric generation to offset consumption and improve energy efficiency across the portfolio.

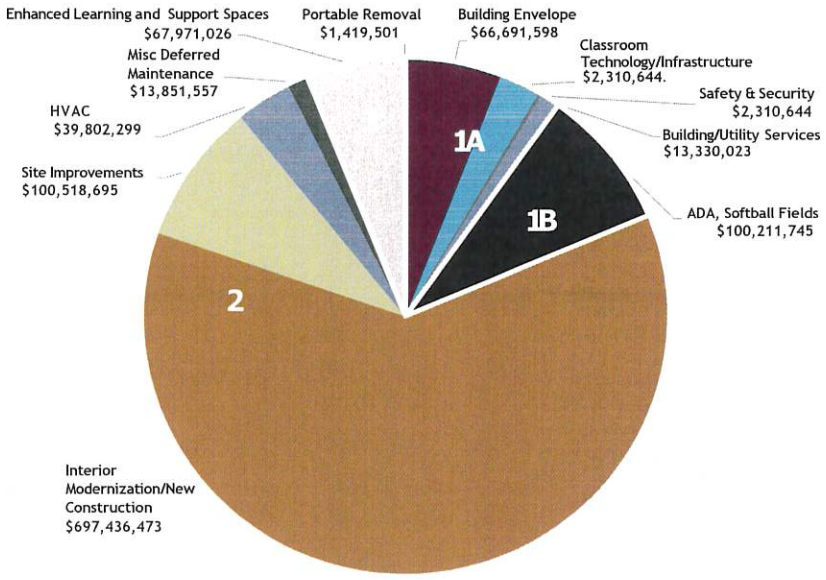
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# Cost Estimate

Cost Estimate

# Cost Estimate

## District Wide Cost Categories in 2024




***Total Cost Estimate Without Escalation/Contingency Rate: ~1.1 Billion***

Fig.5.1 Cost estimate by category in 2024 dollars. To see additional cost with escalation/contingency rate applied, see the table on next page.

Rough order of magnitude cost estimates were developed to identify the potential funding needs at the district scale based on the earlier identified priority areas. Utilizing RS Means cost per unit data (Pasadena CA market), baseline costs were determined for each potential project. After establishing the baseline costs, adjustments were made to accommodate federal and local labor requirements, soft costs, and alignment with BUSD-specific requirements and past costs. It is important to note that costs reflect quarter 4 of 2023. To develop actual project costs, the cost estimates should be escalated to the mid-point of the project. While recent market variability makes projection difficult, a general compounding escalation rate of 3% to 5% is recommended.

**Tier 1A** places an emphasis on infrastructure upgrades, campus security, and life safety ensuring a safe environment for learning. This section is at a total of $111,174,601 constituting 9.8% of the total. Nearly half of the Tier 1A funds are allocated to improving the building envelope—windows, walls, roofs, and doors. Another quarter is dedicated to technology improvements, while the remaining portion focuses on building utility services and site security.

**Tier 1B** is directed towards ensuring equitable access to each campus, this includes ADA accessibility standards, ramps, elevators, and lifts, and new turf for softball fields at the high schools. At $100,211,745 tier 1B makes up 8.8% of the total.

**Tier 2** the largest tier, comprises 75.2% of the total. It is committed to elevating the overall learning environment, including enhancements to classrooms, furniture, building systems, and outdoor spaces. The majority, 61.6% of the total cost, is allocated to interior modernizations and new construction. The second-largest portion focuses on exterior site improvements including lunch shelters, play structures, parking needs, utility lines, and landscaping. HVAC deficiencies and miscellaneous deferred maintenance make up the remaining portions, with the total cost of Tier 2 is $851,609,025.

**Tier 3** primarily aims at enhancing educational support services and enriching extracurricular spaces, constituting 6% of the total budget. The second portion of Tier 3 is dedicated to portable removal, representing only 6.1% of the grand total at $69,390,528.

| | $2024$ | Estimated Escalation & Contingencies |
|---|---|---|
| **Priority 1A Costs Totals** | $111,174,601 | $147,862,220 |
| **Priority 1B Costs Totals** | $100,211,746 | $133,281,622 |
| **Priority 2 Costs Totals** | $851,609,025 | $1,132,640,003 |
| **Priority 3 Costs Totals** | $69,390,529 | $92,289,403 |

# Table of Contents

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Appendix C: Enrollment Projection Report

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Appendix E: Cost Analysis

Appendix F: Site Profiles and Potential Projects

Appendix G: State Funding Report

# Appendix A: Educational Specifications

Burbank Unified School District

# 2023

## FACILITIES MASTER PLAN – EDUCATIONAL SPECIFICATIONS

APPENDIX 'A'



# EDUCATIONAL SPECIFICATIONS

## Purpose of This Document

### Educational Specifications

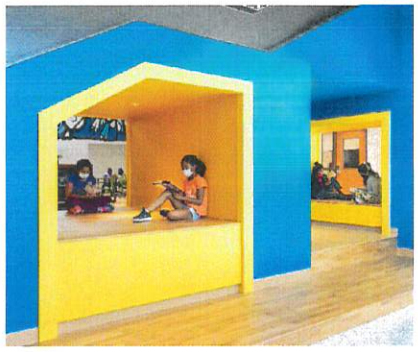
Educational Specifications (Ed Specs) guide the development, planning, and design of new schools and the modernization of existing ones. Ed Specs specify the spaces, relationships between spaces, and physical characteristics that educators believe are required to support the operation of a school and its specific educational program. The Ed Specs detail elements that support teaching, learning, and the school community based on the vision laid out in the 2023 Facilities Master Plan.

> "A true educational specification is a dynamic, visionary document reflecting activities that engage students. The educational vision must reflect specific needs within the community so the educational program must grow out of dialogue with all user groups."
>
> Council for Educational Facility Planners International (now A4LE), Creating Connections publication.

### Considerations

1. The square footages in this report are guidelines to promote parity between school improvements. It is understood that, when renovating and/or reconfiguring existing building spaces, achieving these exact square footages may not be possible.
2. Any significant deviations from this specification that may impact the budget, scope prioritization, and Ed Specs criteria should be approved by the District during the programming phase.
3. **Note that the Ed Specs space program provides net square footages, and a grossing factor needs to be applied during implementation.** The net square footages should be multiplied by a 16% grossing factor to obtain the gross square footage for one-story buildings. A higher grossing factor, up to 35%, is needed for two-story buildings. The grossing factor helps to account for internal circulation pathways, utility rooms, and wall thicknesses.
4. At the end of Schematic Design (SD) phase, the Architect shall provide, for each space, detailed room data sheets and basis-of-design (BOD) narratives that address the following elements:
   - Building Systems – mechanical, plumbing, electrical, lighting, security and technology (i.e., educational and network technology)
   - Building Envelop – windows, doors and hardware, roofing systems, and insulation
   - Building Interiors – flooring, ceiling and wall finishes, and presentation surfaces (e.g., tackable and/or whiteboard surfaces)
   - Special Considerations – acoustics, sustainability, healthy materials criteria, furniture layouts, and recommendations for optimization of room function and flexibility

   This SD report shall include scaled floor plans showing adjacencies, net square footages, and a chart comparing the proposed net square footages to those provided in the Ed Specs. Prior to starting the project, refer to the District document standards. Any deviations from these standards must be approved by the applicable District department. Where standards are not defined, the Architect shall provide recommendations based on "best practices" for K12 schools, considering quality, durability, fit for function, maintenance requirements, and overall life cycle cost impacts.



### Resources

California Department of Education
- Title 5 School Facilities Construction
  https://www.cde.ca.gov/ls/fa/sf/title5regs.asp
- Educational Specifications Resources
  https://www.cde.ca.gov/ls/fa/bp/essentialsinschoolfacilities.asp

Perkins Eastman White Papers
- Design for Safe and Healthy Children
  https://www.perkinseastman.com/wp-content/uploads/2020/11/DesignForSafeHealthyChildren_Nov2020.pdf
- Investing in our Future
  https://www.perkinseastman.com/white-papers/investing-in-our-future-how-school-modernization-impacts-indoor-environmental-quality-and-occupants/

Coalition for Adequate School Construction (CASH)
- California School Facilities Research Institute (CSFRI) The Impact of School Facilities on Student Learning and Engagement
  https://californiaschoolfacilitiesresearchinstitute.files.wordpress.com/2022/06/2022-01-13-impact-of-school-facilities.pdf
  *This Study consolidates and summarizes the most significant research linking facility quality to student engagement, learning, and community success. This Study is organized into three main categories—Indoor Environmental Quality, Spatial Environment, and People and Community—and examines their sub-categories' impact on learning performance.*



Appendix 'A'

# EDUCATIONAL SPECIFICATIONS

## High-Quality School Design Matters

### Learner-Centered Design

Teaching and learning are both deeply impacted by the physical environment in which they occur. For a school to be successful and truly support student achievement, it must have a physical environment that addresses the needs and comfort of its occupants. Acknowledging and understanding this relationship is the foundation of school planning and design.

Over the last 50 years, we have gained a better understanding of the human brain and how learning happens. Learner-centered design recognizes that there are many ways to learn and that students have diverse and unique needs. A school facility should be designed to support those diverse experiences through a variety of learning settings.

Learner-centered design should be tailored to the specific educational program to ensure that learning environments align with the program's goals and vision. The following considerations are essential to the planning of learner-responsive environments:

**DIVERSITY**
Current learning models indicate that learning style varies with age, achievement level, gender, culture, and information processing preferences; thus, it is essential that learner-responsive environments accommodate different modes of learning by providing diverse types of learning spaces, addressing the various sensory receptors, and enabling flexibility.

For example, small work areas off classrooms can encourage collaboration, and grouping educational programs into "clusters" allows interdisciplinary teaching. In addition, the design may incorporate different amenities, such as technology infrastructure, acoustic performance, views to the outdoors, access to focus rooms, and movable walls between spaces, depending on the requirements of each specific learning environment.

**AGILITY**
Learning happens everywhere. With increased access to information, students today obtain information in a very different way than they did in the past. To support the needs of next-generation learners, schools should provide technology-rich spaces that allow for a variety of learning activities and movable furniture that can convert the room between different modes of instruction. In addition, designing for flexibility ensures a school's success well into the future by anticipating and preparing for changing needs.

**OWNERSHIP**
A student's sense of ownership can greatly impact their academic success. Access to outdoor teaching spaces, a dedicated place in the classroom to call their own, cubbies, display areas for their work, and small break-out spaces for team projects canall empower students with a sense of ownership while encouraging collaboration.

**WELLBEING**
The health and welfare of students should be at the forefront of any educational design. The physical wellbeing of the student is essential to a successful learning experience. High-performance design strategies can support occupant wellbeing; diffuse natural light, good indoor air quality, and thermal comfort within well-ordered yet stimulating spaces are "best practices" for K12 schools.

In addition, by including wellness centers and after-school expanded learning opportunities, schools can become vital community partners.



### Resources

Collaborative for High-Performance Schools (CHPS)
https://chps.net/

Leadership for Environmental Design (LEED)
- For Existing Buildings
  LEED certification for existing buildings and spaces | U.S. Green Building Council (usgbc.org)
- For Schools
  K-12 education | U.S. Green Building Council (usgbc.org)

Association for Learning Environments (A4LE)
- Healthy Schools
  Healthy Schools | Association for Learning Environments (a4le.org)

> "By all accounts, the education community is in the midst of a profound shift, straddling between the constraints of its legacy while pushing for much-needed change."
>
> Mind Shift Blog, Envision the School Day of the Future by Tina Barseghian, 2010.

# EDUCATIONAL SPECIFICATIONS

## General Requirements

### Finishes

**FLOORING**
Classroom and hallway flooring should be resilient floor finish that requires no waxing for regular maintenance. Consider modular carpet tiles in offices and the library, to be approved by M&O. Sealed concrete, self-leveling epoxy flooring may be used in storage rooms and labs.

**WALLS**
All walls should be gypsum wall board and painted. Refer to acoustics criteria for information regarding acoustic performance of the wall assembly. Walls in hallways and other high-traffic areas shall be high-impact gypsum wall board with metal corner guards. Interior hallways, classrooms, and offices should contain some tackable surfaces. Marker boards should be available in learning spaces to provide writable surfaces on which students can work collaboratively. 8' high tackable/writable boards may be placed vertically so that surfaces will be at the appropriate height for student use. If the appropriate writable surface is specified, cabinet faces and tabletops can also be writable. Offices and small group areas may benefit from having whiteboard surfaces, depending on the function of the space; verify with users.

**CEILINGS**
Ceilings in all spaces shall not be lower than 9'-0" high. The design may dictate open, suspended, and/or hard-surface ceiling finishes. For all spaces, acoustical properties and flexibility should be priority considerations when designing the ceiling. If ceilings are open and equipment, ductwork, building structure, or other items are left exposed, design the exposed items in an orderly fashion and paint them a neutral color for uniformity. Due to the lack of flexibility, hard ceilings should be limited to where required by code with few other exceptions.

### Indoor Environmental Quality

Good indoor environmental quality has been demonstrated to significantly enhance cognition and improve learning outcomes. School design should consider acoustics, daylighting, air quality, thermal comfort, and health building materials.

**ACOUSTICS**
Refer to LEED for Schools and/or CHPS for the minimum design criteria for recommended acoustical performance. As initial criteria, provide the following acoustic properties for classrooms:

- Partition sound transmission should be STC 50 between adjacent classrooms and STC 53 between restroom areas.
- ACT should have a minimum NRC of 0.07.
- Resilient flooring should have acoustic backing properties.
- Full-height walls should isolate and prevent disturbances from adjacent spaces.
- Noise reduction characteristics of any air transfer ducts should be as good as those of the walls and doors they are penetrating.
- Classroom speech reverberation time should be optimized: 0.6 seconds for a classroom with a volume less than 10,000 cubic feet.
- Classrooms should have a background noise no greater than NC-30 or 35 dBA.
- Interior and exterior window glazing and door assembles should be specified so as to maintain acoustical performance.

For assembly spaces, such as gyms and multipurpose rooms, the Architect shall provide an acoustical report to ensure functional acoustical performance of this specialized use space.

**DAYLIGHT**
Natural light is required in every classroom and preferred in every office and conference room. Restrooms, locker rooms, and gyms all benefit from natural light, where practical; this may be achieved through clerestory windows and/or skylights. Specialty spaces require natural light, but an increased ability to control and dim the lighting may be required for improved function and to meet the current energy code.

**VIEWS OF NATURE**
Views to the landscaped exterior are calming and can provide passive supervision; views should be implemented, especially in the interior of the campus.

**AIR QUALITY**
There have been national studies on the effect of good indoor air quality on the cognitive learning of students and student attendance. The design of the ventilation rates should produce an average CO2 level of 550 ppm (target recommended for increased cognitive function by the Harvard T.H. Chan School of Public Health).

**THERMAL COMFORT**
In a study conducted by the Harvard T.H. Chan School of Public Health, it was found that test scores increased by 4% when the temperature of a space did not exceed the upper acceptable thermal limit.

**MATERIALS**
There are dozens of chemicals in everyday building materials that can impact children at their earliest stages and cause adverse health impacts. Prioritize products that provide product-specific material health disclosures, such as Health Product Declarations, Declare Labels, or Cradle to Cradle Certifications, which help to identify chemicals of concern within building products.

### Resources

Mindful Materials
mindful MATERIALS
School Facilities Improve Learning Bibliography - Research (CA Dept of Education)

"Daylight affects students' concentration and general wellbeing. Students in classrooms with windows perform 20% faster on math tests and 26% faster on reading tests than students in windowless classrooms."

L. Heschong and D. Mahone, "Daylighting in Schools: An Investigation into the Relationship Between Daylighting and Human Performance," PG&E, 1999.

# EDUCATIONAL SPECIFICATIONS

Burbank-Specific Program Elements

## Non-Loaded Spaces

**ELEMENTARY SCHOOL ROOM ALLOCATION**

When elementary schools are to be modernized, the following non-loaded spaces should be included in the overall planning of the school prior to modernization:

1. Parent Center
2. STEAM Lab
3. Music Lab
4. Curriculum Specialist / Professional Development Space
5. ELD – English Language Development
6. RSP – Resource Specialist Program
7. RTI – Response to Intervention
8. Large Conference Room (IEP Meetings)

Refer to the chart below to determine the number of loaded general education classrooms needed based on school size. The intention is to allow for some fluctuation of enrollment while maintaining an adequately sized cohort to allow for teacher collaboration. For school sites that have an excess of (3) Special Education classrooms, additional support spaces will be needed for Occupational Therapy, Physical Therapy, a dedicated hygiene room, additional parking, and offices for staff supporting this student population.

| School Size (MAX Students) | TK (Quantities may vary by school) | K-3 Grade Classroom Count | 4 – 5 Grade Classroom Count |
|---|---|---|---|
| 300 – 430 Students | 1 | 12 | 4 |
| 430 – 600 Students | 2 | 16 | 6 |
| 600 – 790 Students | 3 | 20 | 8 |

Note: Special Education Programs and quantity of classrooms vary at each site.

## Programs Supported by the FMP

**CHILDCARE FACILITIES**

BUSD offers its families several before- and after-school care options. Dedicated facilities are located on each campus for this purpose. The FMP includes modernization costs for these spaces to cover general maintenance and upkeep.

**TRANSITIONAL KINDERGARDEN**

In 2021, Governor Gavin Newsom signed Assembly Bill (AB) 130, which will gradually expand Transitional Kindergarten (TK) over a four-year period, between the 2022-23 to 2025-26 school years, until all 4-year-olds can attend a high-quality, developmentally appropriate TK program and enter Kindergarten prepared to learn. There is minimal State funding identified for the facility upgrades needed to fully comply with Title 5 requirements. This grant has been overprescribed since made available.

**ARTS FOR ALL AND PROP. 28 FUNDING**

For over 19 years, Burbank Unified is very proud to be considered a leader in the Los Angeles County Arts Commission Arts for All Initiative. BUSD is well known for its excellence in the arts—a feature that attracts students to the District. Proposition 28 – Arts and Music in Schools Funding was approved on November 8, 2022. However, this grant cannot be used for facility upgrades. The FMP proposes music labs at all elementary schools to support the ongoing efforts to enhance music education.

**FAMILY SERVICES AGENCY (FSA)**

For over 22 years, the Family Service Agency of Burbank, a 501(C)3 non-profit social service agency, has worked with families and students on BUSD's campuses. Recently, Care Centers have been placed at each of the middle and high schools, with various space limitations. This FMP plans for Care Centers on all campuses and costs for expansions, when required.

**DIVERSITY, EQUITY, AND INCLUSION**

Aligned with BUSD's DE&I goals, the FMP has proposed reconfiguration of restrooms at the middle and high school levels to promote a more inclusive community, "creating safe spaces at school campuses to ensure students can show up as their full authentic self without fear of shame or judgement from other students" (June 2022 BUSD DE&I Committee Update). In addition, additional upgrades to the girls' softball fields are proposed at both high schools. Finally, many of the schools require accessibility upgrades to meet newer codes; an allowance for this work is included in the FMP costs.

**SUSTAINABILITY**

As a continuation of the efforts BUSD has made to reduce energy consumption, the FMP proposes photovoltaic (PV) panels to both produce energy and provide shade on the campuses, reducing the heat-island effect.

**NEXT GEN SCIENCE STANDARDS (NGSS)**

The labs in the middle and high schools require upgrades to support the curriculum of NGSS. New STEAM labs are proposed at the elementary schools to support the articulation of science, engineering, and the arts into middle school.

## Resources

Family Services Agency
https://familyserviceagencyofburbank.org/who-we-serve/

California Dept. of Education - UPK/TK
https://www.cde.ca.gov/ci/gs/em/

Arts for All
https://www.burbankusd.org/domain/474

BUSD DE&I
https://www.burbankusd.org/Page/2968

"Family Service Agency of Burbank offers youth a safe, confidential place to reflect, gain understanding, talk, and grow to be healthy, peaceful, and productive."

FSA Website

# EDUCATIONAL SPECIFICATIONS

## BUILDING PROGRAM CATEGORIES AND SPACES

### A Administration

- Lobby
- Reception/Workstation
- Principal Office
- AP/VP Office
- Conference Room
- Multi-Use Office
- Book Room
- Records/Storage
- Staff Restrooms
- Health Suite
- Staff Lounge
- Staff Prep Room
- Curriculum Specialist/ Professional Development

### C Academic

- Preschool/Kindergarten Classrooms (with Restrooms, Teacher Prep Rooms, Storage)
- Typical Classrooms
- Small Group Rooms
- Intervention/Resource Classroom
- Special Education/ Science Lab
- Music/Flex Lab

### S Services

- Parent Center
- Learning Center
- Care Center
- Student All-Access Restrooms

### L Library

- Reading Room
- Stacks
- Story Alcove
- Circulation Desk
- Prep Room/Storage
- STEAM Lab

### X Outdoors

- Play Structures
- Outdoor Learning

### How to Use This Document

The purpose of an Educational Specifications document is to provide guidance for the design of facility spaces, ensuring that each space effectively supports the activities for which they are intended. This document includes space diagrams illustrating preferred adjacencies, a narrative detailing architectural elements, a range of square footages, and various other planning and design considerations. (Note that the square footage ranges account for potential constraints imposed by existing conditions, which may limit the Architect in developing a reconfigured plan that meets the ideal square footages.) These criteria will serve as reference points for the Architect when a proposed project is identified in the FMP, providing initial guidelines. We recommend the active engagement of the applicable department stakeholders, users, and M&O staff, encouraging their participation in the planning process and the review of the basis-of-design documents. As the plans evolve, there may be improvements and adjustments to the Ed Specs and District standards.

Please note that this Ed Specs document only identifies the essential program spaces, reflecting the potential proposed projects outlined in the Site Profiles section; refer to the Appendix for specific site details. For example, there is an Ed Spec for administrative spaces; however, not all campuses require this work; thus, some campuses may require only a portion of the Ed Specs for reference.



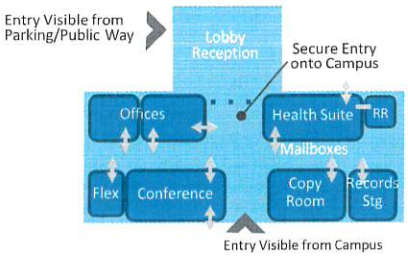







# SPACE PROGRAM AND QUALITIES

| Name of Space | Adjacencies/Access | Architectural Elements | Notes | Total NSF |
|---|---|---|---|---|
| **Administration** | ***At front of campus; easily accessible from parking areas.*** | | | |
| **A01 Lobby** | Visible to the street/parking lot/drop-off; control point for access to the main campus; near public restrooms. | Windows to street/entry; tackable display surface; display case with lockable doors; drinking fountain with bottle filling station; monitor showing campus camera views; display for flyers. | Reception Area – Open office space for (2) workstations. Lobby – Comfort seating for 6; double door entry or wider door (>36"). | 400 |
| **A02 Reception/Workstation** | Open to Administration Lobby; control point for access to the main campus; near staff mailboxes (if not in Staff Workroom); visibility into Nurse Suite. | Window facing campus entrance at student height; accessible reception desk, approximately 20' long with drawer/cabinets/shelves; gate for controlled entry into campus; built-in staff mailboxes with open cubbies below for large boxes. The ceiling in this space may have accent acoustical finishes, higher ceiling height, and accent lighting to make for a more welcoming setting. | Mailboxes near this space so that staff can access without leaving the reception area (should not be in a location that can be accessed by public/visitors); mailboxes may be preferred in the Staff Workroom; hallways to be a minimum of 5' wide. | 300–350 |
| **A03 Principal/AP/VP Office** | Close to reception; second exit to exterior, if possible. | Tackable panel (3'x4') and (3'x4') magnetic whiteboard surface. | Accommodate individual office work and small meetings; credenza; conference table; seating for 4 (Principal's Office only); wall-mounted flat panel monitor (optional). | Principal: 180–200<br>AP/VP: 120–150 |
| **A04 Conference Room** | Adjacent to reception area and Principal's Office. | 8' x 5' whiteboard; wall-mounted flat panel monitor. | Small meetings with staff, public, and/or students; conference table to seat 8–10 people. | 200–250 |
| **A05 Flex Office** | Adjacent to reception area and Principal's Office. | | Accommodate multi-use individual office work and small meetings or a hoteling workstation. | 100–120 |
| **A06 Office Copy Room** | Adjacent to reception area and Principal's Office. | Standing height counter with lower and upper cabinets; deep counters for office equipment; access to power. | Space for large copier/printer (may need to be networked for all staff use). | 150–200 |
| **A07 Health Suite** | Direct view from reception desk. | Continuous cleanable wall surface (e.g., vinyl wall covering); sink (hot and cold water) with base cabinet (5' long) and solid-surface countertop; upper cabinet; 3'-tall cabinet with adjustable shelves; all cabinets lockable; workstation for nurse. | Refrigerator and freezer for icepacks and ice maker; (2) cots with privacy curtains; (2) chairs for guests; height and weight scale; location for wheelchair; wider door (>36"). | 260–300 |
| **A08 Single Use Restroom** | Direct access from Nurse Suite | Sink (hot and cold water); mirror; coat hook; convenience shelf; floor sink; consider use of large format wall and floor tile to reduce grout lines. | Must be accessible. | 60 |




The diagram to the left depicts one admin adjacency option. When renovating spaces, the Architect will be constrained by existing structural bearing/shear walls and may not be able to achieve an ideal layout. Priority should be given to optimizing security and operational workflow and meeting the range of square footages noted above.

Note: This plan is primarily for elementary school programs. Office spaces may vary depending upon the site-specific needs; consider the offices identified in the Learning and Care Center as an extension of the administrative services.


Reception Area


Defined Entry


Admin Offices

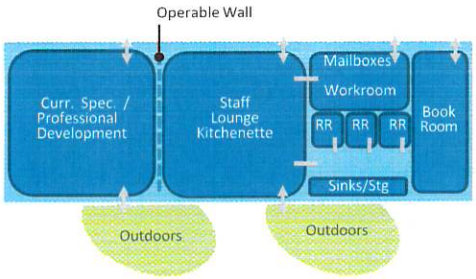

Defined Entry



Appendix 'A'

# SPACE PROGRAM AND QUALITIES

| Name of Space | Adjacencies/Access | Architectural Elements | Notes | Total NSF |
|---|---|---|---|---|
| **Staff Spaces** | ***centrally located on campus*** | | | |
| **A09 Book Room** | Direct to hallway or centrally located on campus; option next to Staff Workroom. | 82"-high adjustable metal bookshelves 12"–24" deep to hold 5,000 volumes. | Bulk storage of textbooks. | 450 |
| **A10 Records and Storage** | Direct to Reception or centrally located on campus; a total of two (2) per campus. | (1) wall 72" high by 12" deep minimum; adjustable metal storage shelves or plastic laminate shelving with 1" thick shelves. | Lockable bulk storage of official school records and office supplies; space for small floor safe, if required. | 80–100 x (2) |
| **A11 Staff Workroom** | Direct to Reception or centrally located on campus; direct access from staff lounge and hallway; locate staff mailboxes here if not off Reception. | (1) 4' x 5' magnetic whiteboard; (1) 4' x 5' tackable surface. | Bulk copying, collating, receiving, and mail distribution; (4) computers with wireless connections; (1) printer; (2) 3'x6' tables; laminator; paper cutter; spiral book binder; (4) copy machines. | 300 |
| **A12 Staff Lounge Kitchenette** | Direct to reception or centrally located on campus; direct access to Staff Prep Room and exterior patio. | Standing-height counter with lower and upper cabinets; double sink with garbage disposal (hot and cold water); (2) refrigerators with ice makers (full-size residential); stove with oven and exhaust hood; microwave; coffee maker; vending machine (optional); (1) 4' x 5' magnetic whiteboard; (1) 4' x 5' tackable surface; resilient flooring at kitchenette and carpet tiles elsewhere; wall-mounted flat panel monitor. | Accommodate 15–20 staff for dining at tables, with the ability to expand into adjacent room for larger Events; interior design to be warm and inviting; accent lighting and accent paint; views to nature and daylighting; a zone for comfortable seating/couch, coffee table; access to outdoor space with shade and seating. | 800–900 |
| **A13 Staff Restrooms (All Inclusive Option)** | Dedicated to faculty/staff use; consider providing single use restrooms with shared sink areas. (Refer to CDE resources on all-access restroom design considerations: https://www.cde.ca.gov/ls/fa/sf/allaccessrestroom.asp#:~:text=(a)%20All%20single%2Duser,more%20than%20one%20occupant%20at.) | | | Varies |
| **A14 Curriculum Specialist/Professional Development Room** | Centrally located on campus; direct access to Staff Lounge via an operable wall to expand events. | On two adjacent walls, provide (2) sliding magnetic whiteboards, vertical mounted, next to (1) large wall-mounted flat panel monitor; ceiling speakers connected to monitor; operable acoustic wall to connect with Lounge; wall to have magnetic whiteboard surface; carpet tile flooring. | Higher ceilings with indirect/direct lighting fixtures; technology-rich space for teacher training; flexible furniture (e.g. mobile chairs, stackable/mobile tables for 4 people, compact desk/lecture for TOSA, mobile storage for materials); access to outdoor space with shade and seating. | 800–960 |




The diagram to the left depicts one TOSA/Staff area adjacency option. When renovating spaces, the Architect will be constrained by existing structural bearing/shear walls and may not be able to achieve an ideal layout. Priority should be given to optimizing functionality and meeting the range of square footages noted above.





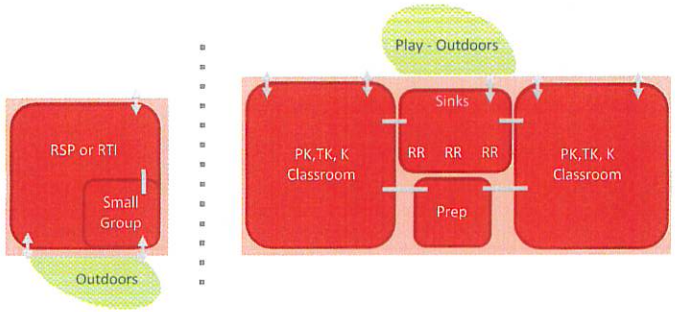







# SPACE PROGRAM AND QUALITIES

| Name of Space | Adjacencies/Access | Architectural Elements | Notes | Program NSF |
|---|---|---|---|---|
| **Academic Spaces** | | | | |
| **C01 Kindergarten/TK Preschool Classrooms** | Close and visible to drop-off/pick-up and Administration; direct access to play yard. | Front learning wall with (2) 8' x 5' magnetic whiteboards; wall-mounted flat panel monitor or monitor on mobile cart; tall storage at back of room, 9' with slider whiteboard doors; 9'-long counter with sink and bubbler at child height and base and upper cabinets; tackable surface above 7' and on (2) walls. | Use bright accent colors sparingly and use colors that are not distracting; majority of finishes to be neutral and timeless; furniture selections to allow for varied seating and table groupings for child ergonomics; multiple area rugs; mobile shelves to create centers and mobile cubbies for backpacks, if hooks are not provided outdoors; lighting to offer varied zones with different lighting settings. | 1,000–1,120 |
| **C02 Prep Room/Storage** | Direct access to classroom; shared between two classrooms. | Built-in cabinets on (3) walls, (2) walls to have tall cabinets with adjustable shelves and (1) shared wall to have counter with base and upper cabinets. | Natural daylighting and view into classroom. | 180–200 |
| **C03 Restroom** | Direct access to classroom and play yard. | Low light switches for small child access. | Fixture and accessory heights to be appropriate for age group; view into restroom vestibule into classroom. | Per Code, (3) for every (2) classrooms |
| **C05 Storage (Outdoor)** | Direct access to Kindergarten play yard; locate adjacent to classroom. | | Metal shelving along (2) walls. | 100 – (1) every (2) classrooms |
| **C06 Typical Classroom** | All classrooms should be prototypical, allowing for flexibility in the future. Classrooms should have direct access to outdoor play areas and to outdoor teaching patios. All Classrooms should be connected to the rest of the school via covered walkways or enclosed corridors. | Front learning wall with (2) 8' x 5' magnetic whiteboards; wall-mounted flat panel monitor or monitor on mobile cart; tall storage at back of room 9' long with slider whiteboard doors; 9'-long counter with sink and bubbler at child height and base and upper cabinets; tackable surface above 7' on (2) walls. | Use bright accent colors sparingly and use colors that are not distracting; majority of finishes to be neutral and timeless; furniture selections to allow for varied seating and table groupings for child ergonomics; mobile shelves and mobile cubbies for backpacks, if hooks are not provided outdoors; lighting to offer varied zones with different lighting settings. | 900–960 |
| **C07 Small Group Room** | Direct access to Resource / Intervention Room. | | Visibility into Intervention Room; access to outdoor space with shade and seating. | 180–200 |
| **C08 Intervention/ Resource Room** | Direct access to small group room; more centrally located on campus. | Same as C06 Typical Classroom. | Furniture to be mobile and easily moved into groups. | 700–760 |




The diagram to the left depicts one option for Intervention and PK/TK/K Classroom adjacencies. When renovating spaces, the Architect will be constrained by existing structural bearing/shear walls and may not be able to achieve an ideal layout. Priority should be given to optimizing functionality and meeting the range of square footages noted above. The combined total of classroom, prep, and restroom spaces should be equivalent to 1,350 SF per classroom per CDE Title 5 recommendations.



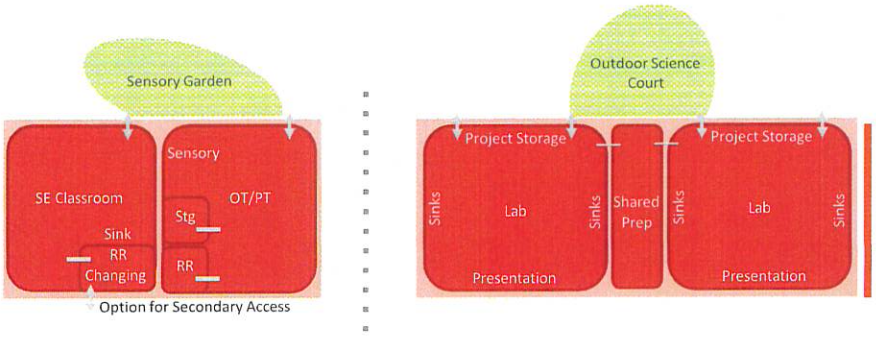






# SPACE PROGRAM AND QUALITIES

| Name of Space | Adjacencies/Access | Architectural Elements | Notes | Program NSF |
|---|---|---|---|---|
| **Academic Spaces** | | | | |
| **C09 Special Education Classroom** | Near Administration or centrally located on campus; location to be well contained within campus enclosed boundary for safety; near Occupational Therapy/Physical Therapy; direct access to restrooms. | Design space for centers; similar technology as in prototypical classroom; tall storage at back of room, 9' long with slider whiteboard doors; 9'-long counter with sink and base and upper cabinets; tackable surface above 7' on (2) walls. | Use sensory-sensitive design strategies (lighting and acoustics are a key design elements for students with special needs); minimize contrast by selecting indirect lighting fixtures; incorporate LED with ability to change color-tone of rooms based on activity and needs. | 900–1000 |
| **C10 Restroom and Changing Room** | Direct access to Classroom; potential secondary access to exterior for increased functional use. | Typical accessible restroom with Hoyer lift for changing transfer system at toilet, shower nozzle at wall; floor drain and large-format ceramic tiles on wall and floor for easy clean up; water-resistive tall cabinet to store supplies. | This space may not be needed in every classroom but instead could be centrally located and used by other students with access from a secondary exterior door. The typical accessible restroom (approx. 100–80 SF plus room for assistant) could be in every classroom instead. | 150–200 |
| **C11 OT/PT, Storage, Restroom** | Near Special Education Classrooms or centrally located on campus, direct access to storage and restroom from OT/PT space. | Work with the Special Education department to determine the types of equipment needed for the OT/PT rooms and if any structural coordination is needed for hanging equipment (e.g., swings). | | 900–1000<br>Storage: 100<br>Restroom: 80 |
| **C12 Science or Flex Lab** | Clustered (2) labs minimum to ease the sharing of equipment. | Tackable surface above base cabinets on (1) wall and on (1) entire wall (either front or back of room); (6) sinks (cold water); 24"-deep counters on opposite walls with solid chemical-resistant surface; base cabinets with adjustable shelving and no drawers; upper cabinets on (1) wall; ceiling retractable power reels; (6) student desks centered in room and (1) at teacher prep table; tall storage with open shelves for student projects (24" X 7' with (5) adjustable shelves). | The room shape should be close to square (approximately 35' x 40') for new labs to improve supervision and student visibility and to provide for better distribution of sinks/lab layouts to meet ADA clearances; (6) 36" x 72" student tables (each table seats 6 students) with lockable casters, gray chemical-resistant surfaces, and stools with backs (36 total seats); mobile teacher demonstration table; typical instructor technology plus additional mounted flat monitors at labs and whiteboard surfaces. | 1,300–1,400 |
| **C13 Prep Room** | Direct access to Lab. | Counter (solid, chemical-resistant surface); 24"-deep base cabinets and 12"-deep upper cabinets with adjustable shelves (glass fronts per site request). | (2) sinks (hot and cold water), under-cabinet mount with goose neck faucet; tall open cabinets with adjustable shelves one wall (24" depth x 7' height with (5) adjustable shelves). | 200 / Lab |




The diagrams to the left depicts one option for Special Ed/OT/PT and Labs adjacencies. When renovating spaces, the Architect will be constrained by existing structural bearing/shear walls and may not be able to achieve an ideal layout. Priority should be given to optimizing functionality and meeting the range of square footages noted above.


Special Ed Classroom

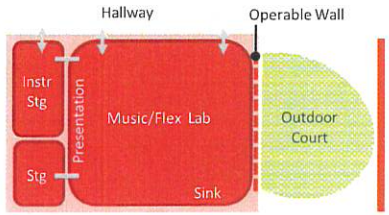

Special Ed PT/OT


Science -Credit: TBp Architect, Irvine USD


Science

# SPACE PROGRAM AND QUALITIES

| Name of Space | Adjacencies/Access | Architectural Elements | Notes | Program NSF |
|---|---|---|---|---|
| **Music Lab** | | | | |
| **M01 Storage** | Direct access to Lab. | 42"-wide and 8'-high door for ease of storing items. | Storage of stacking tables and chairs for use when space is not used for music. | 200 |
| **M02 Music/Flex Lab** | At end of classroom wing, access to exterior; plumbing/sewer lines. | This space will be used for music a few days a week and can be a "scheduled-in" space for the other days of the week for project-based learning or indoor PE activities. Operable acoustic wall between lab and outdoors; flooring appropriate for multi-use; (1) sink for indoor/outdoor use. | Design space for optimal acoustic performance—for a renovation, may require increasing the ceiling height and applying acoustical material on walls or adding acoustical curtains; (1) large flat panel monitor on cart; (2) 5' x 8' magnetic whiteboard at presentation wall, (1) with music lines; small portable storage unit and podium for teacher use. | 1,300 |
| **M03 Instrument Storage** | Buffer between adjacent classrooms to control acoustic transfer; exterior access. | Tall perimeter open shelving with adjustable shelves on (3) walls; high mounted pipes for storing costumes above shelves (requires a pole hook to access). | | 250 |




The diagrams to the left depicts one option for adjacencies to the Music Lab. When placing a new building on an existing campus, the Architect will be constrained by existing site conditions. Priority should be given to making the overall building footprint fit within the campus context and creating new functional opportunities.





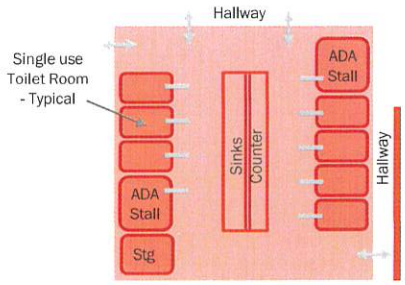




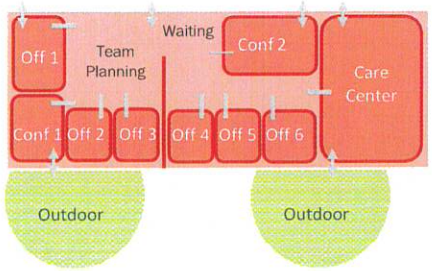



# SPACE PROGRAM AND QUALITIES

| Name of Space | Adjacencies/Access | Architectural Elements | Notes | Program NSF |
|---|---|---|---|---|
| **Support / Student Services** | | | | |
| **S01 Parent Center Restroom (Option)** | Direct access to main circulation; adjacent to Multi-Purpose Room (with door, if possible); exterior door required; close to main office. | Ideally, direct access to a dedicated restroom and small Family Room; may need additional mobile storage carts to store items. | Group meetings and workspace for parents and volunteers; designed as a prototypical classroom for future flexibility in the event more classrooms are needed. | 400 |
| **S02 Learning Center** | Direct access to main circulation; centrally located on campus; near Administration. | At waiting area, built-in display; counter with base cabinet storage; tackable panel; (1) 4'-tall storage with adjustable shelves. | The intent of this Center is to co-locate the leadership team and support services for students, to foster collaboration and teaming. | 1,920 or (2) Existing Classrooms |
| **S02.1 Offices** | Direct access to Team Planning space and waiting area. | For Speech – Conference table (seating for 4).<br>For Psychologist – Comfort seating. | Office 1 = Speech<br>Office 2 = Community Liaison<br>Office 3 = Outreach Consultant<br>Office 4 = Counselor<br>Office 5 = SPED<br>Office 6 = Psychologist | Office 1: 200–250<br>Office 2 - 5: 100–120<br>Office 6: 150–200 |
| **S02.2 Conference Room** | Direct access to Team Planning space and waiting area. | 8' x 5' magnetic whiteboard; wall-mounted flat panel monitor. | Conference table to fit 8–10 people in Conf. 2 and 4 people in Conf. 1. | Conf 1: 120–150<br>Conf 2: 250–300 |
| **S02.3 Team Planning/Waiting** | Direct access from Office and Conference Rooms. | 8' x 5' magnetic whiteboard; wall-mounted flat panel monitor; comfort seating. | Warm tones; indirect lighting or accent lighting should feel inviting. | 500 |
| **S03 Care Center** | Direct access to or near Psychologist. | Wall-mounted flat panel monitor; comfort seating couches. | Warm tones; indirect lighting or accent lighting should feel inviting. | 700–900 |
| **S04 Student All-Access Restrooms** | High School and Middle School option for reconfiguration of existing restroom male/female clusters. Refer to CDE resources on all-access restroom design considerations: https://www.cde.ca.gov/ls/fa/sf/allaccessrestroom.asp#~text=(a)%20All%20single%2Duser,more%20than%20one%20occupant%20at. | | | Varies |




The diagram to the left depicts a Student All-Access Restroom cluster. Ideally, the layout would provide two entry points off two main circulation hallways. Refer to link above for additional design criteria.




The diagram to the left depicts one option for Learning/Care Center adjacencies. When renovating spaces, the Architect will be constrained by existing structural bearing/shear walls and may not be able to achieve an ideal layout. Priority should be given to optimizing functionality and meeting the range of square footages noted above.


Parent Center


Outdoor connection


Used for Project based learning

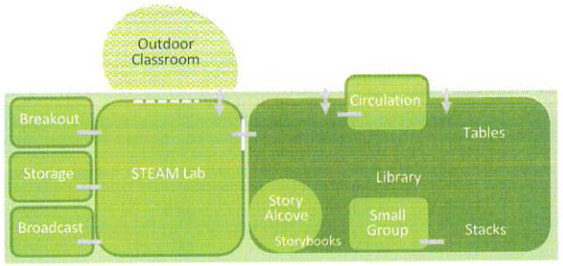

Care Center



Appendix 'A'

# SPACE PROGRAM AND QUALITIES

| Name of Space | Adjacencies/Access | Architectural Elements | Notes | Program NSF |
|---|---|---|---|---|
| **Library** | | | | |
| **L01 Stack Area and Work Space** | Approximately (2) classroom-size at elementary schools and (3–4) classroom-size at Middle schools; direct access to STEAM Lab; direct access to Small Group Room. | Presentation wall with large wall-mounted flat panel monitor or projector and projector screen with speaker system, perimeter shelving, windows for daylighting and views, where desired; approx. 8-10,000 volumes; carpet tiles; low-height mobile stacks in center of room with visibility down aisles from circulation desk; comfort seating in various scales and settings. | Accent colors; murals; accent lighting with zoned controls; ceilings to bring interest into the space and zones; display area with tackable wall surfaces; variety of seating options (including chairs at tables, soft-type seating, and lounging options). | Stacks: 450<br>Work Space: 850 |
| **L02 Story Alcove** | Direct access to open-plan Library. | Clearly distinct from the stacks/work area using accent lighting/ceiling features, colors/murals; should bring a sense of wonder and happiness; open to stacks/work area. | Mobile stools at various heights; gathering place for story time for the younger students; neat picture books or lower-level reading; mobile technology available. | 200–400 |
| **L03 Circulation Desk Prep Area / Storage** | Direct access to open-plan Library. | Clearly distinct from the stacks/work area using accent lighting/ceiling features; 16'-long desk with solid surface countertop; book drop; 9'-long counter with base cabinets and uppers at back wall; (2) 3'-tall cabinets with doors and adjustable shelves; (3) 3' wide x 8' tall magnetic whiteboards in front of counter to use for display. | (1) mobile desk chair; desk with integrated wire management for power and data access; drawers at back of desk; open shelves at back of desk outside workspace/book-drop off; back counter deep enough for tabletop printer with power/data connections; tall cabinets equipped with power for storing mobile tablets. | 200 |
| **L04 Small Group Room** | Direct access to stacks; window to Circulation Desk. | Quieter workspace for students; (1) 4' x 8' magnetic whiteboard; wall-mounted flat panel monito; bluetooth connection to tablets. | Adjustable height chairs; (2) mobile/flip tables; seating for 6 people. | 200–250 |




The diagram to the left depicts one option for Library/STEAM Lab adjacencies. When renovating spaces, the Architect will be constrained by existing structural bearing/shear walls and may not be able to achieve an ideal layout. Priority should be given to optimizing functionality and meeting the range of square footages noted above.


High School Library


Middle School Library


Circulation / Info Desk

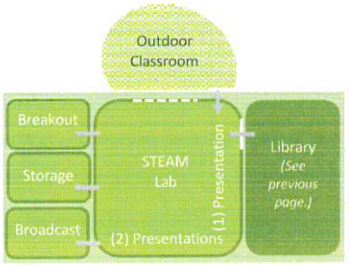

Elementary School Library



Appendix 'A'

# SPACE PROGRAM AND QUALITIES

| Name of Space | Adjacencies/Access | Architectural Elements | Notes | Program NSF |
|---|---|---|---|---|
| **Innovation Lab** | | | | |
| **L05 STEAM Lab** | Direct access to Library, Broadcast Room, Storage, and Breakout/Tech Office. | (3) presentation walls with large wall-mounted flat panel monitors with sound system; at each monitor, (2) vertically-mounted 4' x 8' magnetic whiteboard panels and (1) vertically-mounted 4' x 8' tackable panel; (4) pull-down power cords; 9'-long counter with sink and base and upper cabinets; resilient flooring. | Accent colors and murals to bring interest into the space and zones; a variety of seating/desk options; writeable surface tabletops; adjustable height chairs; butcher block high table with stools; compact station/lecture podium for a teacher. | 800–960 |
| **L06 Broadcast Room** | Direct access to Innovation Lab. | Acoustically sound for podcasting; green wall for video production; higher ceiling and a longer wall to allow for video/camera set up; carpet tiles. | | 200–270 |
| **L07 Breakout Room Tech Office** | Direct access to Innovation Lab | This will be a flex space for student break-out or, if a Tech Coordinator is assigned to the room, this space can become an office. | | 150 |
| **L08 Storage** | Direct access to Innovation Lab. | Tall shelving along perimeter walls with adjustable shelves. | | 200 |




Refer to the next page for model STEAM Lab architectural, technological, and furniture features.


Broadcast Room



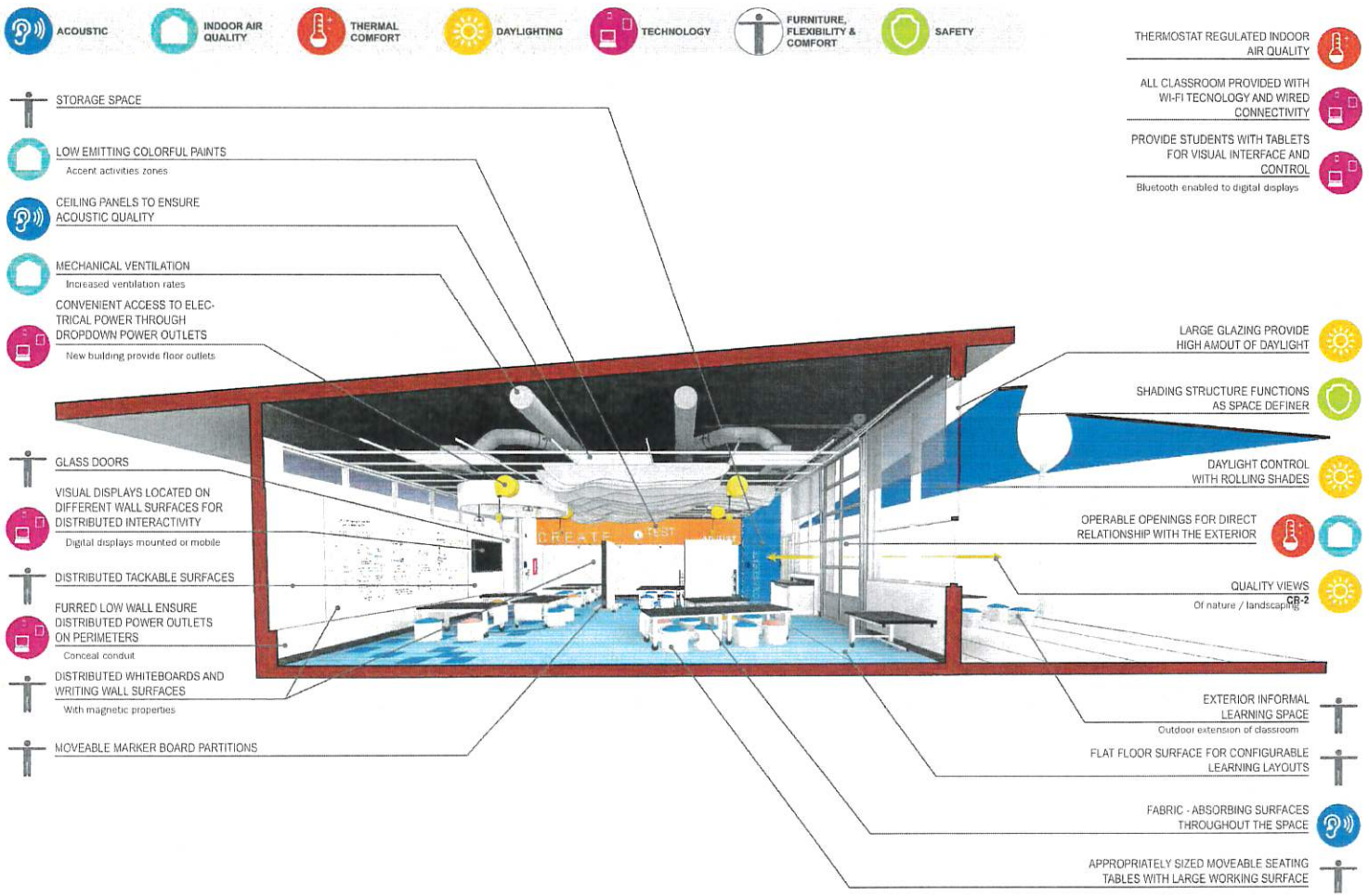
STEAM


STEAM



Appendix 'A'

# MODEL STEAM LAB Architectural, Technology and Furniture Features




The diagram to the left depicts the qualities of a STEAM Lab (aka Maker Space). It is a place to:

- utilize the latest technology;
- engage and captivate students to foster deeper exploration and discovery of classroom content;
- use multiple digital displays, writing surfaces, and display surfaces;
- collaborate in groups; and
- use video cameras for broadcasting.

Many of these features can also be incorporated into the prototypical classroom. Further exploration of these concepts should be discussed with District leadership, campus planning committees, and the facilities team during the early concept design phases of a project.

**DIVERSITY THROUGH FURNITURE SELECTIONS**
Research indicates that providing diverse settings enhances movement and mastery of the environment, thereby increasing learner engagement. Select furniture to offer a range of activity settings, accommodating various student learning preferences. Use diverse mobile furniture types that are appropriately scaled and easily reconfigured to create a versatile array of spaces. Opt for furniture elements that can flip, nest, and stack, enabling occupants to open up space for movement and allowing students to personalize and adapt their environment to suit the lesson. Select furniture that offers students choices in their workspace, promoting collaborative configurations as well as quiet nooks for individual work.



Appendix 'A'

# EDUCATIONAL SPECIFICATIONS

Outdoors

## Outdoor Learning

Courtyards and other outdoor areas should not be treated as an afterthought in school building design. Through thoughtful planning, schools can maximize the use of these communal spaces to establish extended learning environments beyond the classroom. Research indicates that learning outdoors offers both educational and health-related benefits; breathing fresh air can clear students' minds and enhance cognitive function, while being outside can reduce stress and improve emotional well-being.

**Design Elements**
When designing and outfitting outdoor spaces to promote learning, consider these core principles:

**Versatility:** Furnish these spaces with a variety of furniture types that facilitate multiple uses. Opt for agile, modular furniture that can be configured in various ways.

**Comfort:** Ensure the availability of comfortable and easily accessible seating areas for conversation, reading, and studying. Incorporate shaded spots under trees, solar panels, or fabric canopies. Consider painting dark surfaces to mitigate the heat island effect.

**Functionality:** Supply materials to support continuous learning, such as lightweight, mini whiteboards on mobile carts. Provide access to battery charging stations and Wi-Fi if technology is utilized.


Diverse Settings in Play Yard Design


Outdoor Classrooms / Shade

## Play Yard Re-Design

When re-envisioning the existing outdoor play yard, consider accommodating various programs and functions, such as:

- Unstructured Play – New play structure and swings; sensory sones featuring sounds and textures; a grass area outside the structured play are for inventive play; accessible play elements catering to a variety of physical abilities.
- Structured Play – Striped hardscape areas for ball walls, tether ball, and hopscotch; a running/walking path with measured mile markers.
- Physical Education – Hardscape areas for basketball, volleyball, maybe pickleball; a small soccer field with natural turf for 5 v 5 play.
- Large Group Space – Outdoor stage with 250+ seats for assemblies and performances with access to Wi-Fi and power; adjacency to existing outdoor shade/lunch dining space.
- Medium Group Space – Group area for 6-10 students with movable outdoor furniture, shade, writable surfaces, or interactive play elements (e.g., large modular blocks).
- Small Group Space – Group area for 3-6 students with built-in seating and shaded areas, adjacent to active play.
- Individual Space – A more "calming" programmed space (e.g., a peace walk, sensory garden, labyrinth, or reading nooks), adjacency to a quieter area of the play yard.

Ultimately, the play yard should offer a variety of experiences that cater to all levels of students' development and abilities. The design of outdoor spaces can increase greenery, shade, and reduce the heat island effect.

> "Kids can actually pay *better* attention in class after an outdoor lesson. This is nice for teachers, because you don't have to stop teaching and you still get that bump in attention."
>
> Ming Kuo, Research - Do Lessons in Nature Boost Subsequent Classroom Engagement? Refueling Students in Flight

## Resources

Outdoor Learning, Leave the Classroom Behind
https://www.a4le.org/A4LE/Resources/Resource_Center/White_Papers/Outdoor_Learning.aspx

Green Schoolyards America Impact Report
https://www.greenschoolyards.org/s/0315_Impact_v51.pdf

California Education and the Environment Initiative
Home - California Education and the Environment Initiative (EEI) (californiaeei.org)

Amigos De Los Rios
Amigos de los Rios - Green Schools


Outdoor Classroom

# Appendix B: District Standards




# DISTRICT STANDARDS

2023

**Burbank Unified School District**
Facilities Services
1900 W. Olive Avenue
Burbank, CA 91506
Ph: 818-729-5500 • Fax: 818-729-5501

Dec. 21, 2023

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SECTION 02810

LANDSCAPE IRRIGATION

PART 1 - GENERAL

1.01 SUMMARY

A. It is the intent of the specifications and drawings that the finished reclaimed/recycled water irrigation system is complete in every respect and shall be ready for operation satisfactory to the Owner.

B. The work shall include all design, materials, labor, services, transportation, and equipment necessary to perform the work as indicated on the drawings, in these specifications, and as necessary to complete the contract.

C. The work shall include new reclaimed/ recycled irrigation system which will be tying into the existing water purveyor mainline. A new reclaimed water meter shall be placed by the contractor in accordance with the City and water purveyor guidelines. The Contractor is to obtain all necessary permits at no additional cost to the Owner.

D. All City and County codes and guidelines for reclaimed/recycled water shall be adhered to.

1.02 QUALITY ASSURANCE

A. All local, municipal, and state laws, rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the Contractor. Anything contained in these specifications shall not be construed to conflict with any of the above rules and regulations of the same.

B. All materials supplied for this project shall be new and free from any defects. All defective materials shall be replaced immediately at no additional cost to Owner.

1.03 SUBMITTALS

A. Submittals Materials List:

1. After award of contract and before any irrigation system materials are ordered from suppliers or delivered to the job site, submit to the Owner a complete list of all irrigation system materials, or processes proposed to be furnished and installed as part of this contract.

1.04 EXISTING CONDITIONS

A. The Contractor shall verify and be familiar with the locations, size and detail of points of connection provided as the source of water, and electrical supply connection to the irrigation system.

B. Prior to cutting into the soil, the Contractor shall locate all cables, conduits, sewer septic tanks, and other utilities as are commonly encountered underground and he shall take proper precautions not to damage or disturb such improvements. If a conflict exists between such obstacles and the proposed work, the Contractor shall promptly notify the Architect and Owner who will arrange for relocations. The Contractor will proceed in the same manner if a rock layer or any other such conditions are encountered.

C. The Contractor shall protect all existing utilities and features to remain on and adjacent to the project site during construction. Contractor shall repair, at his own cost; all damage resulting from his operations or negligence.

D. The Contractor shall verify and be familiar with the existing irrigation systems in areas adjacent to and within the Project area of work.

E. The Contractor shall protect all existing irrigation systems, in areas adjacent to and within the project area of work, from damage due to his operations.

F. Contractor shall notify Owner's Representative if any existing system is temporarily shut off, capped or modified. Provide 48-hour notice, prior to turning off or modifying any existing irrigation system.

G. The Contractor shall repair or replace all existing irrigation systems, in areas adjacent to and within the project area of work, damaged by the construction of this project. Adjacent irrigation systems shall be made completely operational and provide complete coverage of the existing landscaped areas. All repairs shall be complete to the satisfaction of the Owner's Representative.

H. The contractor shall provide bore holes under any existing pavement or paving encountered for the required lateral, mainline and low voltage control wire sleeving. Bore holes under 2 inches in diameter and smaller shall be made with a BulletMole® underground boring tool as manufactured by Dimension Tools, LLC (Contact telephone number (888)-650-5554 or at www.bulletmole.com). Bore holes larger than 2 inches in diameter shall be made with an approved mechanical boring tool. No air jacking or hydraulic boring of any kind shall be allowed.

1.05 STORAGE AND HANDLING

A. Use all means necessary to protect irrigation system materials before, during, and after installation and to protect the installation work and materials of all other trades. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Owner and at no additional cost to the Owner.

B. Exercise care in handling, loading, unloading, and storing plastic pipe and fittings under cover until ready to install. Transport plastic pipe only on a vehicle with a bed long enough to allow the pipe to lay flat to avoid undue bending and concentrated external load.

1.06 CLEANUP AND DISPOSAL

A. Dispose of waste, trash, and debris in accordance with applicable laws and ordinances and as prescribed by authorities having jurisdiction. Bury no such waste material and debris on the site. Burning of trash and debris will not be permitted. The Contractor shall remove and dispose of rubbish and debris generated by his work and workmen at frequent intervals or when ordered to do so by the Owner's authorized representative.

B. At the time of completion the entire site will be cleared of tools, equipment, rubbish and debris which shall be disposed of off-site in a legal disposal area.

1.07 TURNOVER ITEMS

A. Record Drawings:

1. Record accurately on one set of drawings all changes in the work and the actual final installed locations of all required components.

2. The Contractor shall make neat and legible notations daily on the record progress prints as the work proceeds, showing the work as actually installed. Should equipment location differ from plan, the Contractor must indicate the new location in a graphic manner, matching the original symbols in the irrigation legend. The relocated equipment and the dimensions will then be transferred to the original as-built plan at the proper time.

3. Before the final site inspection, the Contractor shall transfer all information from the as-built record prints to a final “as-built” plan. The “as-built” plan shall be submitted to the Architect for approval prior to the making of the controller chart.

4. The Contractor shall dimension the following locations from two permanent points of reference (building corners, sidewalks, road intersections, etc.):

    a. Connection to existing water lines

    b. Connection to existing electrical power supply

    c. Connection of all buried pipe

    d. Gate and ball valves

    e. Sprinkler pressure line routing and directional turns (dimension maximum 100 feet along routing).

    f. Automatic controller

    g. Sprinkler control valves

    h. Remote control valves

    i. Control wire routing and pilot wires to valves

    j. Quick coupling valves

    k. Backflow prevention units

    l. Tracer wires (main line routing)

    m. Irrigation water meters

    n. Electrical meters

    o. Booster pump

    p. Drippers, drip tubes, and devices

    q. Other related equipment as directed by the Architect.

5. On or before the date of the final site review, the Contractor shall deliver the updated and completed reproducible drawings to the Architect. Delivery of these drawings does not relieve the Contractor of responsibility for furnishing any required information that may have been omitted from the prints.

B. Controller Charts.

1. As-built record drawings must be approved by the Architect before controller charts are prepared.

2. The Contractor shall provide two controller charts for each controller installed.

3. The chart shall show control wire locations and the area controlled by the automatic controller, and shall be the maximum size that the controller door will allow.

4. The chart shall be based on the record drawing, and shall be a half size photocopy or black line print. Chart shall have a different color used to show area of coverage for each station (hydrozone). However, in the event that the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable when reduced.

5. When completed and approved, hermetically seal the chart between two pieces of plastic (thickness of each piece being minimum 20 mils). Place a 3/4 inch brass grommet at each top corner.

6. These charts must be completed and approved prior to final acceptance of the irrigation system. Installation will not be accepted without charts.

7. Upon approval, the two controller charts will be placed inside each controller.

C. Operation and Maintenance Manuals.

1. Prepare and deliver to the Owner within ten (10) calendar days prior to completion of construction two hardcover, three-ring binders containing all required and necessary descriptive material. The manual shall describe the material installed and shall be in sufficient detail to permit the operation personnel to understand, operate and maintain all equipment. Each complete manual shall include the following information:

   a. Index sheet stating Contractor's address and telephone number

   b. List of equipment with names, addresses, and telephone numbers of local manufacturer representatives.

   c. Catalog and parts sheets regarding all material and equipment installed under this contract

   d. Duration of guaranty period and warranty statement

   e. Complete operating and maintenance instruction on all major equipment

2. In addition to the above-mentioned maintenance manuals, instruct The Owner’s maintenance personnel regarding operation of major equipment and show written evidence to the Owner at the conclusion of the project that this service has been rendered.

D. Make arrangements for water and electric utilities and pay for main extensions, service piping, meters and any other charges imposed by the serving utility companies, prior to rendering service.

E. Equipment to be Furnished.

1. The Contractor shall supply as part of this contract the following tools:

a. Two (2) sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve supplied on this project.

b. Two (2) five foot valve keys for operation of gate valves.

c. Two (2) keys for each automatic controller.

d. One (1) quick coupler key and matching hose swivel for every five (5) or fraction thereof of each type of quick coupling valve installed.

e. Twelve (12) additional sprinkler heads of each type as specified on this project.

2. The Contractor shall turn over this equipment to the Owner at the conclusion of the project. Before final acceptance can occur, written evidence that the Owner has received materials must be shown to the Architect.

1.08 COMPLETION

A. At the time of the pre-maintenance period inspection, the Owner's authorized representative and governing agencies will inspect the work, and if not accepted, will prepare a list of items to be completed by the Contractor. Punch list to be checked off by contractor and submitted to Architect or Owner’s Authorized representative prior to any follow-up meeting. This checked off list to indicate that all punch list items have been completed. At the time of the post-maintenance period or final inspection the work will be re-inspected and final acceptance will be in writing by the Architect, Owner's authorized representative, and governing agencies.

B. The Owner's authorized representative shall have final authority on all portions of the work.

C. After the system has been completed, the Contractor shall instruct Owner's authorized representative in the operation and maintenance of the irrigation system and shall furnish a complete set of operating and maintenance instructions.

D. Any settling of trenches which may occur during the one-year period following acceptance shall be repaired to the Owner's satisfaction by the Contractor without any additional expense to the Owner. Repairs shall include the complete restoration of all damage to planting, paving or other improvements of any kind as a result of the work.

1.09 WARRANTY

A. The entire sprinkler system, including all work done under this contract, shall be unconditionally guaranteed against all defects and fault of material and workmanship, including settling of backfilled areas below grade, for a period of one (1) year following the filing of the Notice of Completion.

PART 2 - MATERIALS

2.01 SUMMARY

A. Use only new materials of the manufacturer, size and type to match the existing system. Materials or equipment installed or furnished that do not meet Architect's, Owner's, or

governing agencies standards will be rejected and shall be removed from the site at no expense to the Owner.

2.02 PIPE

A. Pressure supply lines 1 1/2 inches in diameter and smaller downstream of the backflow prevention unit shall be Schedule 40 solvent weld PVC conforming to ASTM D1785.

B. Pressure main line piping for sizes 2-1/2 and smaller shall be PVC Schedule 80 with solvent welded joints. Piping for sizes 3” and larger shall be AWWA C900.

C. Non-pressure lines 3/4 inch in diameter and larger downstream of the remote control valve shall be SCH 40 solvent weld PVC conforming to ASTM D1785.

D. On grade non-pressure lines 3/4 inch in diameter and larger downstream of the remote control valve shall be Schedule.40 UV resistant solvent weld PVC conforming to ASTM D1785.

2.03 METAL PIPE AND FITTINGS

A. Brass pipe shall be 85 percent red brass, ANSI, IPS Standard 125 pounds, Schedule 40 screwed pipe.

B. Fittings shall be medium brass, screwed 125-pound class.

C. Copper pipe and fittings shall be Type "K" sweat soldered, or brazed as indicated on the drawings.

2.04 PLASTIC PIPE AND FITTINGS

A. Pipe shall be marked continuously with manufacturer's name, nominal pipe size, schedule or class, PVC type and grade, National Sanitation Foundation approval, Commercial Standards designation, and date of extrusion.

B. All plastic pipe shall be extruded of an improved PVC virgin pipe compound in accordance with ASTM D2672, ASTM D2241 or ASTM D1785.

C. All solvent weld PVC fittings shall be standard weight Schedule 40 (and Schedule 80 where specified on the irrigation detail sheet, all mainline fittings shall be Schedule 80 PVC) and shall be injection molded of an improved virgin PVC fitting compound. Slip PVC fittings shall be the "deep socket" bracketed type. Threaded plastic fittings shall be injection molded. All tees and ells shall be side gated. All fittings shall conform to ASTM D2464 and ASTM D2466.

D. All threaded nipples shall be standard weight Schedule 80 with molded threads and shall conform to ASTM D1785.

E. All solvent cementing of plastic pipe and fittings shall be a two-step process, using primer and solvent cement applied per the manufacturer's recommendations. Cement shall be of a fluid consistency, not gel-like or ropy. Solvent cementing shall be in conformance with ASTM D2564 and ASTM D2855.

F. When connection is plastic to metal, female adapters shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be non-lead base Teflon paste, tape, or equal.

G. All pressure mainlines installed with solvent weld PVC fittings shall be installed with concrete thrust blocking at all directional changes in the mainline routing. Concrete thrust blocking shall not be required when ductile iron fittings and mechanical restraints are specified.

H. Supplier shall be responsible to certify that manufactured pipe and fittings meets the stated levels of quality. All PVC pipe and fittings must bear the following continuous and permanent markings:

1. Manufacturer's name or trademark
2. Material designation
3. Nominal pipe size and applicable IPS schedule
4. Manufacturer's lot number
5. Schedule or class
6. ASTM qualifying designation
7. Pressure rating in PSI
8. NSF (National Sanitation Foundation) approval
9. Date of extrusion

2.05 VALVES

A. Ball Valves:

1. Ball valves shall be of the manufacturer, size, and type indicated on the drawings.
2. Ball valves shall be constructed of a bronze or stainless steel body, stainless steel ball and stem. Ball valves shall have threaded connections.
3. All ball valves shall have a minimum working pressure of not less than 150 PSI and shall conform to AWWA standards.
4. All Valves shall be installed per detail.

B. Quick Coupler Valves:

1. Quick coupler valves shall be of the manufacturer, size, and type indicated on the drawings.
2. Quick coupler valves shall be brass with a wall thickness guaranteed to withstand normal working pressure of 150 psi without leakage. Valves shall have 1" female threads opening at base, with two-piece body. Valves to be operated only with a coupler key, designed for that purpose. Coupler key is inserted into valve and a positive, watertight connection shall be made between the coupler key and valve.

C. Automatic Control Valves:

1. Automatic control valves shall be of the manufacturer, size, and type indicated on the drawings.

2. Automatic control valves shall be electrically operated.

3. Provide Christy's valve ID tags for each remote control valve with valve number.

2.06 VALVE BOXES

A. Valve boxes shall be fabricated from a durable, weather-resistant plastic material resistant to sunlight and chemical action of soils.

B. The valve box cover shall be green in color and secured with a hidden latch mechanism or bolts.

C. The cover and box shall be capable of sustaining a load of 1,500 pounds.

D. Valve box extensions shall be by the same manufacturer as the valve box.

E. The plastic irrigation valve box cover shall be an overlapping type.

F. Automatic control valve and ball valve boxes shall be 17"x11"x12" ‘nominal’ rectangular size. Valve box covers shall be marked "RCV" with the valve identification number, or “BV” "heat branded" onto the cover in 1-1/4 inch high letters / numbers.

G. Drip flush valve and Air relief valve boxes shall be 6" circular size. Valve box covers shall be marked with "FV" or “ARV” "heat branded" onto the cover in 1-1/4 inch high letters.

H. Quick coupler valve boxes shall be 10" circular size. Valve box covers shall be marked with "QCV" "heat branded" onto the cover in 1-1/4 inch high letters.

2.07 ELECTRICAL

A. All electrical equipment shall be NEMA Type 3, waterproofed for exterior installations.

B. All electrical work shall conform to local codes and ordinances.

2.08 LOW VOLTAGE CONTROL WIRING

A. Remote control wire shall be direct-burial AWG-UF type, size as indicated on the drawings, and in no case smaller than 14 gauge.

B. Connections shall of the manufacturer, size, and type indicated on the drawings.

C. Splices, where permitted, shall be waterproof, using King Innovation Connectors, or approved equal.

D. Common wires shall be white in color. Control wires shall be red (where two or more controllers are used, the control wires shall be a different color for each controller. These colors shall be noted on the "Record Drawings" plans located on controller door).

E. Ground wires shall be green in color or bare copper and in no case smaller than 6 gauge.

2.09 IRRIGATION HEADS AND DRIP EMITTERS AND INLINE DRIP TUBING

A. Irrigation heads, drip emitters and inline drip tubing shall be of the manufacturer, size, type, with radius of throw, operating pressure, and discharge rate indicated on the drawings.

B. Irrigation heads, drip emitters and inline drip tubing shall be used as indicated on the drawings.

C. Irrigation heads shall have purple recycled water warning cover where reclaimed/recycled water is used.

2.10 DRIP IRRIGATION EQUIPMENT

A. Drip tubing equipment such as flush valves, air relief valves, wye strainers and pressure regulators shall be of the manufacturer, size, and type indicated on the drawings.

2.11 AUTOMATIC CONTROL SYSTEM

A. Automatic controller. Refer to plan for required manufacturer's name and model number. Provide pump start relay switch if required.

B. Automatic controller control system shall consist of a 110 volt, single phase, electric clock control unit and shall be capable of being operated manually.

C. Automatic controller to have the following features:

1. Minimum number of stations required.

2. Programmed for various schedules entirely by setting switches and dials, and shall be equipped with the following features:

a. Each station shall be capable of operating 2 minutes to 60 minutes with incrementally variable timing periods for each station; automatic, semi-automatic and manual operation. Each station to have an "OFF" or "OMIT" switch.

b. Repeat switch allowing any and all stations to be repeated after completion of the initial watering schedule, or allowing repeat operations for any or all stations to be scheduled throughout a 24 hour day.

c. "ON-OFF" switch for turning controller "OFF" during rainy weather, while allowing day and hour clocks to continue in operation.

d. Capable of operating 24 volt electric valves.

2.12 MISCELLANEOUS EQUIPMENT

A. Landscape Fabric:

1. Landscape fabric for valve box assemblies shall be 5.0- oz. weight woven

2. polypropylene weed barrier. Landscape fabric shall have a burst strength of 225 PSI, a puncture strength of 60 lbs. and capable of water flow of 12 gallons per minute per square foot.

3. Type: DeWitt Pro 5 Weed Barrier or approved equal.

B. Equipment such as flow sensors, rain sensors, flush valves, air relief valves, wye strainers, and master valves shall be of the manufacturer, size and type indicated on the drawings.

2.13 BURBANK UNIFIED SCHOOL DISTRICT STANDARDS (Minimum requirements)

A. Provide and install the following District approved products and systems.

1. Pressure Supply Line (Up to 3” in diameter) – Manufactured by Lasco, or approved equal; Schedule 40; connect with primer and glue.

2. Pressure Supply Line (Greater than 3” in diameter) – Manufactured by Lasco, or approved equal; Class 150 gasketed.

3. Lawn Field Head – Manufactured by Hunter (Model I-25;Model I-40 on sports fields); stainless steel rotors, check valves on all heads, no PGP or 160 rotors; on-swing joints.

4. Planter Head – Manufactured by Hunter; 6” or 12” Pro Series; on-swing joints.

5. PVC Solvent – Manufactured by Weld-on, or approved equal, #711.

6. PVC Primer – Manufactured by Weld-on, or approved equal; purple.

7. Valve Box – Manufactured by NDS, or approved equal; install plastic box in grassless areas and turf lawns, concrete box with cast iron lid in sidewalks and driveways; 12”x18” box for single box, 14”x23” for double valves.

8. Gate Valves – Manufactured by Nibco; brass thread-on.

9. Control Clock – Manufactured by Rainmaster, Evolution DX with ProMax Remote; remote controllable; 1” conduit pathway to MDF room.

10. Electric Remote Control Valve – Manufactured by Superior, 950 DW; install strainer ahead of backflow/gate valve immediately upstream of each control valve. Install tags for station identification.

11. Backflow Preventer – Manufactured by Febco, 8 Series, vertical. Install pressure regulator on systems designed for 150 psi or greater water pressure.

12. Backflow Preventer (for reclaimed/recycled water irrigation systems) – Wilkins Zurn BF. Install pressure regulator on systems designed for 150 psi or greater water pressure.

13. Ball Valve – Manufactured by Nibco; brass thread-on.

14. Lateral Lines – Manufactured by Lasco, or approved equal; Schedule 40; primer and glue.

15. Swing Joints – Triple swing joint with Marlex Street ells; Schedule 80 PVC riser, length as required.

16. Quick Coupler – Manufactured by Rainbird, 44K; rubber cover with hinge; purple – recycled, yellow – domestic.

PART 3 - EXECUTION

3.01 SITE CONDITIONS

A. Inspections:

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

2. Verify that irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original design, the referenced standards, and the manufacturer's recommendations.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect or Owner's authorized representative.

2. Do not proceed with installation in areas of discrepancy until all discrepancies have been resolved.

C. Grades:

1. Before starting work, carefully check all grades to determine that work may safely proceed, keeping within the specified material depths with respect to finish grade.

2. Final grades shall be accepted by the Engineer before work on this section will be allowed to begin.

D. Field Measurements:

1. Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design. Contractor shall coordinate the installation of all irrigation materials with all other work.

2. All scaled dimensions are approximate. The Contractor shall check and verify all size dimensions prior to proceeding with work under this section.

3. Exercise extreme care in excavating and working near existing utilities. Contractor shall be responsible for damages to utilities, which are caused by his operations or neglect.

E. Layout:

1. Prior to installation, the Contractor shall stake out all pressure supply lines, routing and location of sprinkler heads, valves, backflow preventer, and automatic controller.

2. Layout irrigation system and make minor adjustments required due to differences between site and drawings. Where piping is shown on drawings under paved areas, but running parallel and adjacent to planted areas, install the piping in the planted areas.

F. Existing Conditions:

1. The Contractor shall reconstruct any existing irrigation lines which are to remain in service if they interfere or are damaged by construction. Reconstruction of irrigation lines shall conform to the applicable sections of the specifications, using all new materials (except existing sprinkler heads, which may be reinstalled).

2. When modifications to existing irrigation system are part of the project, verify the operation of all existing irrigation controllers, remote control valves, quick coupling valves, and sprinkler heads prior to commencing work. Notify The Owner in writing of

any inoperable equipment. Maintain 12 inches of cover over all existing lateral lines and 24 inches of cover over existing main lines 3 inches and smaller in diameter. Maintain 30 inches of cover over top of main lines 4 inches and larger in diameter. Reconnect existing remote control valves with approved watertight connectors.

3.02 TRENCHING

A. Excavations shall be straight with vertical sides, even grade, and support pipe continuously on bottom of trench. Trenching excavation shall follow layout indicated on drawings to the depths below finished grade and as noted. Where lines occur under paved area, these dimensions shall be considered below subgrade.

B. Provide minimum cover of 18 inches on pressure supply lines 2 ½ inches and smaller.

C. Provide minimum cover of 18 inches for control wires within planters.

D. Provide minimum cover of 24 inches for control wires within sleeves below paving.

E. Provide minimum cover of 36 inches on pressure supply lines under vehicular travel ways.

F. Provide minimum cover of 12 inches for non-pressure lines.

G. Pipes installed in a common trench shall have a 4-inch minimum space between pipes.

H. Sleeving under paved areas shall have a minimum cover of 24”.

3.03 THRUST BLOCKS

A. Thrust blocks must be constructed of Class “B” concrete.

B. Thrust blocks shall be poured against undisturbed site soil.

C. PVC fitting joints shall be kept free of concrete. Do not encase fitting in concrete.

D. Thrust blocking shall be sized to provide the minimum bearing areas as shown below. Bearing areas indicated have been calculated for Class 200 PVC pipe at a test pressure of 150 PSI in soil with 2,000 PSI bearing capacity. Increase thrust block sizing as necessary for varying soil conditions.

1. Provide a minimum thrust block bearing area of 2.0 square feet on all bends (all degrees) and tees installed on pressure supply lines 4 inches and smaller.

3.04 BACKFILLING

A. Backfill material on all lines shall be the same as adjacent soil free of debris, litter, and rocks over 1/2 inches in diameter.

B. Backfill shall be tamped in 4-inch layers under the pipe and uniformly on both sides for the full width of the trench and the full length of the pipe. Backfill materials shall be sufficiently damp to permit thorough compaction, free of voids. Backfill shall be compacted to dry density equal to adjacent undisturbed soil and shall conform to adjacent grades.

C. Flooding in lieu of tamping is not allowed.

D. Under no circumstances shall truck wheels be used to compact backfill.

E. Provide sand backfill a minimum of 4 inches over and under all piping under paved areas.

3.05 PIPING

A. Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. No hydraulic driving is permitted under asphalt pavement.

B. Cutting or breaking of existing pavement is not permitted.

C. Carefully inspect all pipe and fittings before installation, removing dirt, scale, burrs, and reaming. Install pipe with all markings up for visual inspection and verification.

D. Remove all dented and damaged pipe sections.

E. All lines shall have a minimum clearance of 4 inches from each other and 12 inches from lines of other trades.

F. Parallel lines shall not be installed directly over each other.

G. In solvent welding, use only the specified primer and solvent cement and make all joints in strict accordance with the manufacturer's recommended methods including wiping all excess solvent from each weld. Allow solvent welds at least 15 minutes setup time before moving or handling and 24 hours curing time before filling.

H. PVC pipe shall be installed in a manner, which will provide for expansion and contraction as recommended by the pipe manufacturer.

I. Center load all plastic pipe prior to pressure testing.

J. All threaded plastic-to-plastic connections shall be assembled using Teflon tape or Teflon paste.

K. For plastic-to-metal connections, work the metal connections first. Use a non-hardening pipe dope an all threaded plastic-to-metal connections, except where noted otherwise. All plastic-to-metal connections shall be made with plastic female adapters.

3.06 CONTROL WIRING

A. Low voltage control wiring shall occupy the same trench and shall be installed along the same route as the pressure supply lines whenever possible.

B. Where more than one wire is placed in a trench, the wiring shall be taped together in a bundle at intervals of 10 feet. Bundle shall be secured to the mainline with tape at intervals of 20 feet.

C. All connections shall be of an approved type and shall occur in a valve box. Provide an 18-inch service loop at each connection.

D. An expansion loop of 12 inches shall be provided at each wire connection and/or directional change, and one of 24 inches shall be provided at each remote control valve.

E. A continuous run of wire shall be used between a controller and each remote control valve. Under no circumstances shall splices be used without prior approval.

3.07 VALVES

A. Automatic control valves, quick coupler, and ball valves are to be installed in the approximate locations indicated on the drawings.

B. Valve shall be installed in shrub areas whenever possible.

C. Install all valves as indicated in the detail drawings.

D. Valves to be installed in valve boxes shall be installed one valve per box.

E. Provide valve ID tags for each remote control valve with valve number.

3.08 VALVE BOXES

A. Valve boxes shall be installed in shrub areas whenever possible.

B. Each valve box shall be installed on a foundation of 3/4 inch gravel backfill, 3 cubic feet minimum. Valve boxes shall be installed with their tops 1/2 inch above the surface of surrounding finish grade in lawn areas and 2 inches above finish grade in ground cover areas.

3.09 FLUSHING THE SYSTEM

A. Prior to installation of irrigation heads, the valves shall be opened and a full head of water used to flush out the lines and risers.

B. Irrigation heads shall be installed after flushing the system has been completed.

3.10 ADJUSTING THE SYSTEM

A. Contractor shall adjust valves, align heads, and check the coverage of each system prior to coverage test.

B. If it is determined by the Architect or Owner's authorized representative that additional adjustments or nozzle changes will be required to provide proper coverage, all necessary changes or adjustments shall be made prior to any planting.

C. The entire system shall be operating properly before any planting operations commence.

D. Automatic control valves are to be adjusted so that the irrigation heads, drip emitters and inline drip tubing operate at the pressure recommended by the manufacturer.

3.11 TESTING AND OBSERVATION

A. Do not allow or cause any of the work of this section to be covered up or enclosed until it has been observed, tested and accepted by the Architect, Owner, and governing agencies.

B. Maintain a set of current and up to date plans on the job site at all times. No site observations will commence without record drawings and current plans.

C. The Contractor shall be solely responsible for notifying the Architect, Owner, and governing agencies, a minimum of 48 hours in advance, where and when the work is ready for testing.

D. When the sprinkler system is completed, the Contractor shall perform a coverage test of each system in its entirety to determine if the water coverage for the planted areas is complete and adequate in the presence of the Architect.

E. The Contractor shall furnish all materials and perform all work required to correct any inadequacies of coverage due to deviations from the plans, or where the system has been willfully installed as indicated on the drawings when it is obviously inadequate, without bringing this to the attention of the Architect. This test shall be accepted by the Architect and accomplished before starting any planting.

F. Areas to be maintained for the formal maintenance period shall start maintenance at the same time, as directed by the Architect, Owner, and governing agencies. Partial areas will not be released into maintenance prior to completion of items listed in the pre-maintenance review. The maintenance period may not be phased.

G. Testing of Irrigation System.

1. Pressure test irrigation main lines following the flushing of the complete system. Test main lines for 4 hours at 125 p.s.i. with all control valves in place and closed. During the test, provide pressure gauges downstream from the backflow device and upstream from the farthest remote control valve in the system.
2. Testing of pressure main lines must occur prior to installation of electric control valves, quick couplers or any other equipment that might prevent a proper test from being performed.
3. Test lateral lines at line pressure with risers capped after expelling air from piping. Each lateral lines shall be tested for a minimum of 20 minutes; install pressure gauge at one riser per lateral during test. Maintain pressure in piping for time indicated.
4. Test all piping under paved areas under hydrostatic pressure of 150 pounds per square inch, and prove watertight prior to paving.
5. During the test period all the pipe joints shall be inspected for leakage. Pipes showing leakage shall be replaced. Clean and recaulk imperfect joints. Upon completion of repairs, the section shall again be subject to the test for two hours. The test will be repeated until the entire system is proven watertight or leakage does not exceed that as recommended by manufacturer. Perform all tests in the presence of the Architect, County Health Department, Burbank Water and Power or other duly authorized representative of The Owner. No pipes shall be backfilled until they have been inspected, tested and approved in writing.
6. Furnish necessary force pump and all other test equipment, if permanent connection is unavailable.
7. When the sprinkler irrigation system is completed, perform a coverage test in the presence of the Architect to confirm that water coverage for planting areas is complete and adequate. Furnish all materials and perform all work required to correct any inadequacies of coverage due to deviations from plans, or where the system has been willfully installed as indicated on the drawings when it is obviously inadequate without notifying the Owner. This test shall be accomplished before any planting occurs.
8. Provide handheld walkie-talkie or personnel as necessary to accomplish this task expeditiously.
9. Upon completion of each phase of work, test and adjust entire system to meet site requirements.
10. Test any low voltage wiring more than 50 feet long installed under paving for continuity prior to paving.

H. Final Observation Prior to Acceptance

1. Operate each system in its entirety for the Architect at time of final observation. Any items deemed unacceptable by the Architect due to noncompliance with the

specifications and drawings shall be corrected to the complete satisfaction of the Architect.

2. Operate automatic controller rain sensor at conclusion of maintenance period to confirm proper operation.

3. Evidence must be shown to the Architect that the Owner has received all required irrigation equipment, charts, record drawings, etc. as noted herein before final observation can occur.

I. Conclusion of Maintenance Period

1. At end of maintenance period, submit written confirmation to The Architect that the system is operating properly, as per final acceptance, and note any changes/adjustments made during maintenance period.

3.12 MAINTENANCE

A. During the maintenance period the Contractor shall adjust and maintain the irrigation system in a fully operational condition providing complete irrigation coverage to all intended plantings.

B. The entire sprinkler irrigation system shall be operated automatically for a period of seven days prior to any planting.

C. The Owner reserves the right to waive or shorten the operation period.

D. After maintenance period, demonstrate in presence of the Architectthat the system is in proper operating order.

3.13 COMPLETION CLEANING

A. Clean up shall be made as each portion of the work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be swept, and any damage sustained on the work of others shall be repaired to original conditions.

END OF SECTION

# SECTION 02880

# PLAYGROUND EQUIPMENT

## PART 1 - GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Provide playground equipment, as indicated, specified, and required.

A. Work In This Section: Principal items include playground equipment for kindergarten, primary and upper level children.

B. Related Work Specified Elsewhere:

1. Rubberized surfacing on play equipment areas.

2. Concrete for equipment foundations.

3. Earthwork for foundations.

1.02 QUALITY ASSURANCE: Playground equipment shall be installed by a firm having not less than 5 years experience in installation of playgroung equipment similar to that specified herein, and trained by the manufacturer in installation of specified equipment.

1.03 SUBMITTALS:

A. Product Data: Submit for each item, including technical data and installation instructions. Submit printed specification data for each component. Submit technical data on adhesives and fasteners.

B. Shop Drawings: Submit detailed shop drawings of each item of equipment. Provide plans with model numbers, descriptive labels, component names, and deck heights. Show component parts, connection devices, welding, and colors. Show complete installation and anchorage details. Coordinate numbering of parts and components with technical data specified above.

C. Certification:

1. Submit IPEMA certificates attesting that equipment furnished under this section is in compliance with ASTM F 1487.
2. 
3. Submit evidence of installer's qualifications, including list of similar projects installed over the past 5 years, and certification of training and acceptance by manufacturer.
4. Submit certification showing compliance with CPSC requirements and ADA “Final Accessibility Guideleines for Play Areas” requirements.

D. Samples:

1. Submit color cards showing available colors for each item.

2. Submit 12 inches square or 12 inches long, sample of each finish in each color selected.

E. Maintenance Materials: Provide the following:

1. Finish Paint: Provide one 4.5 ounce can of aerosol spray paint matching each color used on the project for touch-up purposes.

2. Primer: Provide one 4.5 ounce can of rust resistant gray primer spray aerosol as a first coat for component touch-up.

3. Graffiti Remover: Provide one 8 ounce container of liquid graffiti remover. Ingredients consist of biodegradable surfactants, solvents, and citrus distillate.

4. Sandpaper: Provide one sheet each of 80, 100, and 150 grit sandpaper.

5. Hardware for Pipe Systems: Provide a bag of assorted hardware, hex wrenches and screw driver bits of all sizes used on the project.

F. Maintenance Instructions: Conform to requirements of Section 01730. Provide a 3 ring binder containing system guidelines, a structure drawing, installation instructions, maintenance documents, and warranty information. Include playground safety tips, preventive maintenance schedule, and inspection check list.

1.04 WARRANTY: Refer to Section 01740. In addition to warranties specified in Section 01740, provide warranties as follows:

A. Lifetime Warranty against structural failure due to weather corrosion or defects in materials and workmanship on aluminum deck posts, steel deck posts, clamping/fastening, and associated fastening hardware.

B. 15 Year Warranty against structural failure due to weather corrosion or defects in materials and workmanship on steel support legs and components on play system steel components including railings, rungs, and rigid climbers, and.

C. One Year Warranty against structural failure caused by defective materials or defective workmanship on main support materials and decks and seats for swings, and moving parts including swing hangers, swivels, chains, whirls, trolleys and flexible climbers.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER:

Little Tikes Commercial
1615 Airpark Drive

Farmington MO 63640
(800) 325-8828

2.02 EQUIPMENT: See drawings for type, style, configuration, size, and height of playground equipment, structure or modular unit. Colors shall be as indicated. See District approved list of playground equipment and standard playground layouts per school grade.

PART 3 – EXECUTION

3.01 INSPECTION: Report in writing all conditions that prevent or interfere with correct installation of work of this section.

3.02 INSTALLATION: Locate as shown. Install each item of equipment as detailed on drawings, and as shown on approved submittals. The installation shall conform to CPSC guidelines for public playgrounds.

A. Anchor playground equipment to the ground using concrete footings in accordance With approved manufacturer's installation instructions. Unless otherwise noted, primary footings (at *6x6* posts) shall have a minimum diameter of 15 inches and a minimum depth of 18 inches below the resilient surface. Secondary footings (galvanized steel tubing support at slide brackets, climbers, and similar items) shall have a minimum diameter of 12 inches and a minimum depth of 18 inches below the resilient surfacing.

B. Provide a concrete coverage of 12 inches minimum at all recycled plastic posts and 8 inches minimum at all metal posts. Provide a minimum clearance of 3 inches minimum from the edges of all steel posts to grade and 2 inches minimum from all edges of recycled plastic posts to grade. Concrete used for footings shall have a minimum strength of 3,000 PSI.

END OF SECTION

# SECTION 02882

# PLAYGROUND SAFETY MATTING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Furnish all labor, materials, tools and equipment necessary to install monofilament artificial grass FieldTurf as indicated on the plans and as specified herein; including components and accessories required for a complete installation. including but not limited to
   1. Acceptance of prepared sub-base.
   2. Coordination with related trades to ensure a complete, integrated, and timely installation: Aggregate base course, sub-base material (tested for permeability), grading and compacting, piping and drain components (when required); as provided under its respective trade section.

### 1.2 REFERENCE STANDARDS

A. FM Factory Mutual
   1. P7825 - Approval Guide; Factory Mutual Research Corporation; current edition

B. ASTM – American Society for Testing and Materials.
   1. D1577 - Standard Test Method for Linear Density of Textile Fiber
   2. D5848 - Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering
   3. D1338 - Standard Test Method for Tuft Bind of Pile Yarn Floor Covering
   4. D1682 - Standard Method of Test for Breaking Load and Elongation of Textile Fabrics
   5. D5034 - Standard Test Method of Breaking Strength and Elongation of Textile Fabrics (Grab Test)
   6. D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity
   7. D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
   8. D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.

### 1.3 SUBMITTALS

A. Substitutions: Other products are acceptable if in compliance with all requirements of these specifications. Submit alternate products to Architect for approval prior to bidding in accordance Section 01 25 13, Product Substitution Procedures.
   1. Provide substantiation that proposed system does not violate any other manufacturer's patents, patents allowed or patents pending.
   2. Provide a sample copy of insured, non-prorated warranty and insurance policy information.

B. Comply with Section 01 33 00, Submittals Procedures. Submit for approval prior to fabrication.

C. Product Data:
   1. Submit manufacturer's catalog cuts, material safety data sheets (MSDS), brochures, specifications; preparation and installation instructions and recommendations; storage, handling requirements and recommendations.
   2. Submit fiber manufacturer's name, type of fiber and composition of fiber.
   3. Submit data in sufficient detail to indicate compliance with the contract documents.
   4. Submit manufacturer's instructions for installation.
   5. Submit manufacturer's instructions for maintenance for the proper care and preventative maintenance of the synthetic turf system, including painting and markings.

D. Samples: Submit samples, 6 x 6 inches, illustrating details of finished product in amounts as required by General Requirements, or as requested by Architect.

E. Product Certification:
   1. Submit manufacturer’s certification that products and materials comply with requirements of the specifications.
   2. Submit test results indicating compliance with Reference Standards.

F. List of existing installations: Submit list including respective Owner’s representative and telephone number.

G. Warranties: Submit warranty and ensure that forms have been completed in Owner's name and registered with approved manufacturer.

H. Testing Certification: Submit certified copies of independent (third-party) laboratory reports on ASTM testing:
   1. Pile Height, Face Weight & Total Fabric Weight, ASTM D5848.
   2. Primary & Secondary Backing Weights, ASTM D5848.
   3. Tuft Bind, ASTM D1335.
   4. Grab Tear Strength, ASTM D1682 or D5034.
   5. Water Permeability, ASTM D4491

1.4 QUALITY ASSURANCE

A. Comply with Section 01 43 00, Quality Assurance.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section. The turf contractor and/or the turf manufacturer:
   1. Shall be experienced in the manufacture and installation of specified type of synthetic infill monofilament grass system for a minimum of three years with the same manufacturer, product and company they are proposing for this project. This includes use of a spined monofilament fiber, backing, the backing coating, and the installation method.
   2. Shall have 500 projects in use for at least two years with the same manufacturer and company they are proposing for this field.
   3. Shall have a minimum of 3000 installations in North America.

C. Installer: Company shall specialize in performing the work of this section. The Contractor shall provide competent workmen skilled in this specific type of synthetic grass installation.
   1. The designated Supervisory Personnel on the project shall be certified, in writing by the turf manufacturer, as competent in the installation of specified monofilament

material, including gluing seams and proper installation of the infill mixture.
2. Installer shall be certified by the manufacturer and licensed.
3. The installer supervisor shall have a minimum of 5 years experience as either a construction manager or a supervisor of synthetic turf installations

D. Pre-Installation Conference: Conduct conference at project site at time to be determined by Architect. Review methods and procedures related to installation including, but not limited to, the following:
1. Inspect and discuss existing conditions and preparatory work performed under other contracts.
2. In addition to the Contractor and the installer, arrange for the attendance of installers affected by the Work, The Owner's representative, and the Architect.

E. The Contractor shall verify special conditions required for the installation of the system.

F. The Contractor shall notify the Architect of any discrepancies.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store components with labels intact and legible.

B. Protect from damage during delivery, storage, handling and installation. Protect from damage by other trades.

C. Inspect all delivered materials and products to ensure they are undamaged and in good condition.

D. Comply with manufacturer's recommendations.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate the Work with installation of work of related trades as the Work proceeds.

B. Sequence the Work in order to prevent deterioration of installed system.

1.7 WARRANTY AND GUARANTEE

A. See Section 01780 - Closeout Submittals, For Additional Warranty Requirements.

B. The Contractor shall provide a warranty to the Owner that covers defects in materials and workmanship of the turf for a period of eight (8) years from the date of substantial completion. The turf manufacturer must verify that their representative has inspected the installation and that the work conforms to the manufacturer's requirements. The manufacturer's warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism, and acts of God beyond the control of the Owner or the manufacturer. The warranty shall be fully third party insured; pre paid for the entire 8 year term and be non-prorated. The Contractor shall provide a warranty to the Owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the manufacturer's recommendations and any written directives of the manufacturer's representative. The insurance policy must be underwritten by an "AM Best" A rated carrier and must reflect the following values:

1. Pre-Paid 8-year insured warranty.

2. No maximum per claim coverage amount.

3. Minimum of thirty-two-million dollar ($32,0000,000) annual aggregate

4. Must cover full 100% replacement value of total square footage installed.

5. Policies that include self insurance or self retention clauses shall not be considered.

6. Policy cannot include any form of deductible amount.

7. Sample policy must be provided at time of bid to prove that policy is in force. A letter from an agent or a sample Certificate of Insurance will not be acceptable.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURER AND DISTRIBUTOR

A. Approved manufacturers are as follows:

1. FieldTurf USA Inc.
175 N. Industrial Blvd
Calhoun, GA 30701

Commercial Representative
Charles Colletti
2750 La Mirada Drive
Vista CA 92081
858-208-8449

### 2.2 MATERIALS AND PRODUCTS

A. Artificial grass FieldTurf system materials shall consist of the following:
1. Carpet made of “ridged” monofilament polyethylene fibers tufted into a fibrous, non-perforated, porous backing.
2. Infill: Controlled mixture of graded sand and rubber crumb that partially covers the carpet.
3. Glue, thread, paint, seaming fabric and other materials used to install and mark the artificial grass monofilament FieldTurf.

B. The installed artificial grass monofilament FieldTurf shall have the following properties:

| Standard | Property | Specification |
|---|---|---|
| ASTM D1577 | Fiber Denier | 9,000 |
| ASTM D5823 | Pile Height | 1.625” |
| ASTM D5793 | Stitch Gauge | 3/8” |
| ASTM D5848 | Pile Weight | 65oz/square yard |
| ASTM D5848 | Primary Backing | 7oz/square yard |
| ASTM D4491 | Carpet Permeability | 250 inches/hour |

C. Carpet shall consist of ridged monofilament fibers tufted into a primary backing with a secondary backing.

D. Backing:
   1. Primary backing shall be a double-layered polypropylene fabric treated with UV inhibitors.
   2. Secondary backing shall consist of an application of porous, heat-activated urethane to permanently lock the fiber tufts in place.
   3. Perforated (with punched holes), backed turf is unacceptable.
   4. Turf with attached scrim in lieu of porous, heat activated urethane is unacceptable.

E. Fiber shall be 9,000 denier, low friction, and UV-resistant fiber measuring not less than 1.625 inches high.

F. Infill materials shall be approved by the manufacturer.
   1. Infill shall consist of a resilient layered granular system, comprising selected and graded silica sand

G. Glue for seaming of turf shall be as recommended by the synthetic turf manufacturer.

## 2.3 QUALITY CONTROL IN MANUFACTURING

A. The manufacturer shall own and operate its own manufacturing plant in North America. Both tufting of the fibers into the backing materials and coating of the turf system must be done in-house by the turf manufacturer. Outsourcing of either is unacceptable.

B. The manufacturer shall have full-time certified in-house inspectors at their manufacturing plant that are experts with industry standards.

C. The manufacturer’s full-time in-house certified inspectors shall perform pre-tufting fiber testing on tensile strength, elongation, tenacity, denier, shrinkage, and twist i.e., turns per inch, upon receipt of fiber spools from fiber manufacturer.

D. Primary backing shall be inspected by the manufacturer’s full-time certified in-house inspectors before tufting begins.

E. The manufacturer’s full-time in-house certified inspectors shall verify “pick count”, yarn density in relation to the backing, to ensure the accurate amount of face yarn per square inch.

F. The manufacturer’s full-time, in-house, certified inspectors shall perform turf inspections at all levels of production including during the tufting process and at the final stages before the turf is loaded onto the truck for delivery.

G. The manufacturer shall have its own, in-house laboratory where samples of turf are retained and analyzed, based on standard industry tests, performed by full-time, in-house, certified inspectors.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Verify that all sub-base leveling is complete prior to installation.

B. Installer shall examine the surface to receive the synthetic turf and accept the sub-base planarity in writing prior to the beginning of installation.
   1. Acceptance is dependent upon the Owner’s test results indicating compaction and

planarity are in compliance with manufacturer's specifications.

2. The surface shall be accepted by Installer as "clean" as installation commences and shall be maintained in that condition throughout the process.

C. Compaction of the aggregate base shall be 95%, in accordance with ASTM D1557 (Modified Proctor procedure); and the surface tolerance shall not exceed 0-1/4 inch over 10 feet and 0-½" from design grade.

D. Correct conditions detrimental to timely and proper completion of Work.

E. Do not proceed until unsatisfactory conditions are corrected.

F. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Prior to the beginning of installation, inspect the sub-base for tolerance to grade.

B. Sub-base acceptance shall be subject to receipt of test results (by others) for compaction and planarity that sub-base is in compliance with manufacturer's specifications and recommendations.

C. When requested by Architect, installed sub-base shall be tested for porosity prior to the installation of the monofilament turf. A sub base that drains poorly is an unacceptable substrate

3.3 INSTALLATION - GENERAL

A. The installation shall be performed in full compliance with approved Shop Drawings.

B. Only trained technicians, skilled in the installation of synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, top dressing or brushing operations.

C. The designated Supervisory personnel on the project must be certified, in writing by the turf manufacturer, as competent in the installation of this material, including gluing seams and proper installation of the Infill mixture.

3.4 INSTALLATION

A. Install at location(s) indicated, to comply with final shop drawings, manufacturers'/installer's instructions.

B. The Contractor shall strictly adhere to specified procedures. Any variance from these requirements shall be provided in writing, by the manufacturer's on-site representative, and submitted to the Architect and/or Owner, verifying that the changes do not in any way affect the Warranty. Infill materials shall be approved by the manufacturer and installed in accordance with the manufacturer's standard procedures.

C. Carpet rolls shall be installed directly over the properly prepared aggregate base. Extreme care shall be taken to avoid disturbing the aggregate base, both in regard to compaction and planarity.

1. Repair and properly compact any disturbed areas of the aggregate base as recommended by manufacturer
2. Seams shall be flat, tight, and permanent with no separation or fraying.

D. Infill Materials:
   1. Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. The Infill installation consists of a sand

E. Upon completion of installation, the finished project shall be inspected by the installation crew and an installation supervisor.

3.5 RECYCLING

A. Manufacturer must commit to a “take back” program once the useful life of the turf surface has lapsed. Upon removal of the turf surface, at least 75% of the turf surface must be recycled.

END OF SECTION

# SECTION 07525

# SBS MODIFIED BITUMINOUS MEMBRANE ROOFING, COLD-APPLIED

# (NEW CONSTRUCTION)

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section Includes:

1. Installation of Styrene-butadiene-styrene (SBS) modified bituminous membrane roofing system, including but not limited to:

a. Crickets at all curbs, between drain points, and where necessary to provide a minimum 1/4:12 slope.

b. Roof membrane and membrane base flashings.

1) One Burmastic Composite Ply base sheet.

2) Two Burmastic Glass Ply sheets.

3) One Powerply Standard FR cap sheet.

4) TPA flashings.

c. T24 Color Coat coating.

### 1.3 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Cold Process Built Up Roofing – An asbestos free formulation of asphalt, solvent, thixotrope, mineral stabilizer and reinforcing fibers used as an interply adhesive.

### 1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

C. Roofing Membrane System Load-Strain Properties: Provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following minimum load-strain properties at membrane failure when tested according to ASTM D 2523:

1. Tensile strain at failure, at 73 dg F: 490 lbf/in machine direction, minimum; 3.37% percent elongation, maximum.

2. Tensile strain at failure, at 73 dg F: 400 lbf/in cross-machine direction, minimum; 3.47% percent elongation, maximum.

D. Fire-Test-Response Characteristics: Provide roofing system that has a UL Class A fire rating.

E. Flashings and Fastening: Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with requirements and recommendations of the following:

1. FMG 1-49: Loss Prevention Data Sheet for Perimeter Flashings.

2. FMG 1-29 rev. May 2005: Loss Prevention Data Sheet for Above Deck Roof Components.

3. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.

4. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.

## 1.5 ACTION SUBMITTALS

A. Product Data and MSDS Sheets: For each type of product specified.

1. Highlight characteristics that confirm compliance with specified products.

B. Samples in the following quantities:

1. 3-by-5 inch sample of roof base sheet.

2. 3-by-5 inch sample of roof ply sheet.

3. 3-by-5 inch sample of roof cap sheet.

4. 3-by-5 inch sample of flashing membrane.

5. 3-by-5 inch sample of stripping ply.

## 1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Product Certificate: Submit letter, indicating products intended for Work of this Section, including product names and numbers and manufacturers’ names, with

statement indicating that products to be provided meet the requirements of the Contract Documents.

B. Qualification Data: For Installer and Roofing Inspector. Include letter from Manufacturer written for this Project indicating approval.

C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of compliance with performance requirements, including roofing membrane system load/strain property test report.

2. Indicate that proposed system components are compatible.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of built-up roofing.

E. Warranties: Sample of special warranties.

F. Inspection Reports: Daily reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions taken to correct defective work.

1. Submit reports to the District and Architect daily.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For built-up roofing to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years experience installing similar work, and qualified by the manufacturer to furnish warranty of type specified.

1. Installer must acquire three inspection service days utilizing manufacturer’s technical inspector. Inspector must be present for deck preparation, base sheet installation, cap sheet installation, and coating installation.

B. Manufacturer Qualifications: A qualified manufacturer that is UL listed for built-up roofing identical to that used for this Project.

C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer’s compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.

D. Source Limitations: Obtain roofing system components from or approved in writing by roofing system manufacturer.

E. Exterior Fire-Test Exposure: UL Class A; as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

F. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, roofing Installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.10 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Field measurements and material quantities:

1. Contractor shall have sole responsibility for accuracy of all measurements, estimates of material quantities and sizes, and site conditions that will affect work.

C. Waste Disposal:

1. Do not re-use, re-cycle or dispose of material manufacturers product containers except in accordance with all applicable regulations. The user of manufactured products is responsible for proper use and disposal of product containers.

2. Do not dispose of any materials in District containers.

D. Safety requirements:

1. All application, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.

2. Comply with federal, state, local and Owner fire and safety requirements.

3. Maintain a crewman as a floor area guard whenever roof decking is being repaired or replaced.

4. Maintain fire extinguisher within easy access whenever power tools, roofing kettles, fuels, solvents, torches, and open flames are being used.

1.11 WARRANTY

A. Warranty, General: Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Roof System Warranty, General: Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer:

1. Sheet metal flashing and trim, including roof penetration flashings.

2. Roof curbs, hatches, and penetration flashings.

3. Roof and parapet expansion joint assemblies.

C. Special Warranty: Manufacturer's standard or customized form, in which manufacturer agrees to repair or replace components of built-up roofing that fails in materials or

workmanship within specified warranty period. One manufacturer must provide the warranty for all roof sections. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover boards, walkway products, and other components of built-up roofing.
2. Manufacturer will provide, at no cost to owner, the following services in Years 2, 5, 10, and 15:
    a. Inspection by a Technical Representative and delivery of a written inspection report documenting roof conditions.
3. Warranty Period: 30 years from date of Substantial Completion.

D. Installer's Warranty: Submit roofing Installer's warranty, signed by Installer, covering the Work of this Section and related Sections indicated above, including all components of built-up roofing such as built-up roofing membrane, base flashing, roof insulation, fasteners, cover boards, metal panels, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL

A. Basis of Design: materials, manufacturer’s product designations, and/or manufacturer’s names specified herein shall be regarded as the minimum standard of quality required for work of this Section. All products are also ‘or equal’. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1 and performance requirements in Part 2.

B. Any materials substituted must be done 10 days prior to bid to allow for all contractors to bid the substituted product. All substitutions requested must be submitted with information required in substitution request form.

### 2.2 MANUFACTURERS

A. To be determined but must comply with the criteria in this specification.

### 2.3 BASE-SHEET MATERIALS

A. Base Sheet: Nonperforated, asphalt-coated, polyester/fiberglass/polyester reinforced sheet dusted with fine mineral surfacing on both sides which meets the requirements of ASTM D 4601, Type II, and the following properties:

1. Breaking Strength, minimum, ASTM D 146: machine direction, 130 lbf/in (22.5 kN/m); cross machine direction, 120 lbf/in (21.0 kN/m).

2. Tear Strength, minimum, ASTM D 4073: machine direction, 200 lbf (880 N); cross machine direction, 200 lbf (880 N).

3. Pliability, 1/2 inch (12.7 mm) radius bend, ASTM D 146: No failures.

4. Thickness, minimum, ASTM D 146: 0.05 inch (1.3 mm).

5. Weight, minimum, ASTM D 228: 30 lb/100 sq. ft. (1.4 kg/sq. m.).

## 2.4 ROOFING MEMBRANE PLY SHEETS

A. Ply Sheet: ASTM D 4601, Type II, nonperforated, asphalt-impregnated and coated glass-fiber sheet dusted with fine mineral surfacing on both sides, with the following properties:

1. Breaking Strength, minimum, ASTM D 146: machine direction, 90 lbf/in (15.7 kN/m); cross machine direction, 70 lbf/in (12.2 kN/m).

2. Pliability, 1/2 inch (12.7 mm) radius bend, ASTM D 146: No failures.

## 2.5 ROOFING MEMBRANE CAP SHEETS, SBS-MODIFIED BITUMEN

A. Roofing Membrane Cap Sheet: ASTM D 6163, Grade G, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Exterior Fire-Test Exposure, ASTM E 108: Class A.

2. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction 80.0 lbf/in (14.0 kN/m); cross machine direction 70.0 lbf/in (12.0 kN/m).

3. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction, 100 lbf (440 N); cross machine direction 100 lbf (440 N).

4. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction 7.5 percent; cross machine direction 7.5 percent.

5. Low Temperature Flex, maximum, ASTM D 5147: -15 deg. F (-26 deg. C).

6. Thickness, minimum, ASTM D 5147: 0.120 inch (3 mm).

## 2.6 FLASHING MATERIALS

A. Base Flashing Sheet: ASTM D 4434, Type IV, internally fabric reinforced, uniform, flexible TPA sheet, CRRC listed and California Title 24 Energy Code compliant.

1. Tensile Strength at 0 deg. F (-18 deg. C), minimum, ASTM D 6509: 300 lbf/in (52 kN/m).

2. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D 6509: 100 lbf (0.44 kN).

3. Elongation at 0 deg. F (-18 deg. C), minimum at fabric break, ASTM D 6509: machine direction, 25 percent; cross machine direction, 25 percent.

4. Thickness: 45 mils, nominal.

5. Exposed Face Color: White.

6. Reflectance, ASTM C 1549: 86 percent.
7. Thermal Emittance, ASTM C 1371: .86.
8. Solar Reflectance Index (SRI), ASTM E 1980: 108

B. Stripping/Target Ply Sheet: ASTM D 6162, Grade S, Type III, composite polyester and glass-fiber reinforced, SBS/SIS/SEBS-modified asphalt sheet; smooth surfaced; suitable for application method specified with the following properties:

1. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction 800 lbf/in (140 kN/m); cross machine direction 800 lbf/in (120 kN/m).
2. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction, 1300 lbf (5.7 kN); cross machine direction 1400 lbf (6.2 kN).
3. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 6 percent; cross machine direction, 6 percent.
4. Low Temperature Flex, ASTM D 5147: -40 deg. F (-40 deg. C).
5. Thickness: Minimum, ASTM D 5147: 0.100 inch (2.5 mm).

C. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type I.

D. Flashing Membrane Bonding Adhesive, Low VOC: Elastomeric, low-VOC solvent-based contact-type adhesive for bonding TPA fleece-backed single ply membranes and flashings to substrates.

1. Asbestos Content, EPA/600/R-93/116: None.
2. Density at 77 deg. F (25 deg. C), minimum, ASTM D 1475: 7.0 lb/gal (0.84 kg/L).
3. Percent solids: 25 percent minimum.
4. VOC, maximum, ASTM D 3960: 200 g/L.

E. Water-Based Asphalt Primer: Water-based, polymer modified, asphalt primer with the following physical properties:

1. Asbestos Content, EPA 600/R13/116: None.
2. Non-Volatile Content, minimum, ASTM D 2823: 30 percent.
3. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 2 g/L.

F. Asphalt Roofing Mastic: ASTM D 4586, Type II, Class 1, one-part, asbestos-free, cold-applied mastic specially formulated for compatibility and use with specified roofing membranes and flashings, with the following properties:

1. Asbestos Content, ASTM D 276: None.
2. Volatile Organic Compounds (VOC), maximum, ASTM D 6511: 234 g/L.
3. Nonvolatile Matter, minimum, ASTM D 4586: 85 percent.
4. Density at 77 deg. F (25 deg. C), ASTM D 1475: 9.5 lb/gal (1.15 kg/L).

5. Resistance to Sag, maximum, ASTM D 4586: 1/8 inch (3.1 mm).
6. Viscosity at 77 deg. F (25 deg. C), ASTM D 2196: 480,000 to 1,000,000 cP (480 to 1,000 Pa*s).
7. Moisture Vapor Transmission, ASTM E 398: 0.25 g/100 sq. in./24 hr at 0.020 in. thickness, average.

G. Fluid Applied Flashing System: ASTM D 7311, elastomeric, two-coat single-component moisture triggered polyurethane fluid-applied roofing formulated for application to structural concrete deck, with the following minimum physical properties:

1. Aliphatic Urethane Base Coat:
   a. Asbestos Content, EPA/600/R-93/116: None.
   b. Volatile Organic Compounds (VOC), ASTM D 3960: Not greater than 40 g/L.
   c. Percent solids (by weight), ASTM D 1644: Not less than 85 percent.
2. Aliphatic Urethane Top Coat: UV-stabilized, chemical-resistant top coat:
   a. Asbestos Content, EPA/600/R-93/116: None.
   b. Volatile Organic Compounds (VOC), ASTM D 3960: Not greater than 45 g/L.
   c. Elongation at break, ASTM D 7311: Not less than 340 percent
   d. Tensile Strength, ASTM D 7311: Not less than 1,400 lbf/sq. in.
   e. Tear Resistance, ASTM D 7311: Not less than 150 lbf/in.
   f. Accelerated Weathering, 5000 hour, ASTM D 7311: Pass, no cracking or checking.
   g. Percent solids (by weight), ASTM D 1353: Not less than 85 percent.
3. Fiberglass Reinforcement: Medium to fine fiber, rapid wetting chopped strand glass mat for fluid-applied membrane and flashing.
4. Polyurethane Mastic: Single component, high solids, moisture curing, aromatic polyurethane mastic.
5. Structural Concrete/Masonry Primer: Two-component, 100 percent solids, epoxy penetrating primer for concrete deck surfaces.
6. Metal Surface Primer: Single-component, water based primer to promote adhesion of base coat to metal surfaces.
7. Asphaltic Surfaces Primer: Single-component, multi-substrate primer to promote adhesion of base coat to surfaces recommended by manufacturer.

H. Flashing Sheet Stripping Adhesive: ASTM D 7311, elastomeric, two-coat single-component moisture triggered polyurethane fluid-applied roofing product, with the following minimum physical properties:

1. Asbestos Content, EPA/600/R-93/116: None.

2. Volatile Organic Compounds (VOC), ASTM D 3960: Not greater than 45 g/L.
3. Elongation at break, ASTM D 7311: Not less than 340 percent
4. Tensile Strength, ASTM D 7311: Not less than 1,400 lbf/sq. in.
5. Tear Resistance, ASTM D 7311: Not less than 150 lbf/in.
6. Accelerated Weathering, 5000 hour, ASTM D 7311: Pass, no cracking or checking.
7. Percent solids (by weight), ASTM D 1353: Not less than 85 percent.

I. Solvent-Free Elastomeric Roofing Mastic: One-part, solvent-free, asbestos-free, low-odor elastomeric roof mastic specially formulated for compatibility and use with specified roofing membranes and flashings, with the following properties:

1. Asbestos Content, EPA 600/R13/116: None.
2. Nonvolatile Matter, minimum, ASTM D 4586: 70 percent.
3. Elongation at 77 deg. F (25 deg. C), minimum, ASTM D 412: 1000 percent.
4. Recovery from 500 percent Elongation, minimum, ASTM D 412: 500 percent.
5. Flexibility at -40 deg. F (-40 deg. C), ASTM D 3111: No cracking.

J. Butyl Tape: manufacturer’s term bar sealant.

K. General purpose sealant: Two component (1:1 ratio), solvent free, low odor urethane sealant that is asbestos free, extremely low in odor, quick setting, and does not contain any VOC’s.

1. Density, ASTM D 1875: 8.8 lbs/gal.
2. Hardness, ASTM C 661: Shore A 40 – 44.
3. Tack Free Time, ASTM C 679: 30 – 40 minutes.

L. Urethane sealant: manufacturer’s gun grade, moisture cured, one component polyurethane sealant.

1. Hardness (Shore A), ASTM C 920-02: 40.
2. Bond Durability, ASTM C 920-02: Pass.
3. Stain and Color Change, ASTM C 920-02: None.
4. Accelerated Weathering, ASTM C 920-02: Pass.
5. VOC, ASTM D 3960-02: 85 g/L.

M. Silicone sealant: manufacturer’s low modulus, high performance, one part moisture curing silicone joint sealant.

1. Tensile Strength at maximum elongation, ASTM D 412-87: 200 psi.
2. Tear Resistance (Die C), ASTM D 624-86: 40 pli.
3. Stain and Color Change, ASTM C 510-77: None.

4. UV Resistance, ASTM C794-80: Excellent.
5. VOC, ASTM D 3960-02:0 g/L (less water, less exempt solvent)

N. Urethane Sealant Primer: One part, resin-based primer formulated to prepare concrete and masonry surfaces for the application of urethane sealants, with the following physical properties:

1. Non-Volatile Content, minimum, ASTM D 2369: 42 percent.
2. Flash Point, minimum, ASTM D 93: 94 deg. F (34 deg. C).
3. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 560 g/L.
4. Density at 77 deg. F (25 deg. C), minimum, ASTM D 1875: 8.0 lb/gal (950 g/L).

O. Urethane Sealant Primer: One part primer formulated to prepare metal and plastic surfaces for the application of urethane sealants, with the following physical properties:

1. Non-Volatile Content, minimum, ASTM D 2369: 5 percent.
2. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 233 g/L.
3. Density at 77 deg. F (25 deg. C), minimum, ASTM D 1875: 8.3 lb/gal (1000 g/L).

## 2.7 ADHESIVE MATERIALS

A. General: Adhesive and sealant materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Ply and Cap Sheet Adhesive: One-part, asbestos-free, low-volatile, cold-applied adhesive specially formulated for compatibility and use with specified roofing membranes and flashings, with the following physical properties:

1. Asbestos Content, EPA 600 R-93/116: None.
2. Volatile Organic Compounds (VOC), maximum, ASTM D 6511: <250 g/L.
3. Nonvolatile Content, minimum, ASTM D 6511: 75 percent.
4. Flash Point, minimum, ASTM D 93: 100 deg. F (38 deg. C).
5. Density at 77 deg. F (25 deg. C), ASTM D 6511: 8.0 lb/gal (950 g/L).
6. Uniformity and Consistency, ASTM D 6511: Pass.
7. Asphalt Content, minimum, ASTM D 6511: 40 percent.

## 2.8 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.

B. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane

components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

C. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

2.9 ROOF INSULATION

A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

B. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes for sloping to drain and at transitions. Include on the high side of all curbs. Use individual pieces no greater than 2 ½" thick.

1. 1/4:12 inch slope min.

2. Polyisocyanurate cricket material with 1/2 inch thick wood-fiber cover board.

2.10 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

C. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

D. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

E. Cover Board: ASTM C 208, Type II, Grade 2, Cellulosic-fiber and water-resistant binders, asphalt coated on six sides and chemically treated for deterioration.

1. Thickness ½" inch

F. Substrate Joint Tape: 6- or 8-inch-(150- or 200-mm-) wide, coated, glass-fiber joint tape.

2.11 WOOD BLOCKING AND CURBS

A. Lumber:

1. Douglas Fur free from warping and visible decay; pressure-treated with chromated copper arsenate (CCA) to meet AWPB, LP-22, 0.40 retention, and marked.

a. Wood nailers: match insulation height x 6" minimum.

b. Curb height: minimum 8" off finished roof surface.

B. Woodfiber cant: 4” x 4”.

2.12 METAL FLASHINGS

A. Metal edge flashing:

1. Twenty-four (24) gauge Galvalume steel coated both sides with a layer of 55% aluminum-zinc alloy coated by the hot dip process per ASTM specification A792/A792M.

a. Rise: 3/8”.

b. Fascia: extend 1” further down the fascia board than previous edge metal.

c. Color to be selected by the Architect.

B. Termination bar:

1. Aluminum bar:

a. 1/8 x 1 inch (3.2 x 25.4 mm).

C. Counterflashing and counterflashing extensions:

1. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.

2. Galvanized Steel Sheet: ASTM A526, G90, commercial quality, or ASTM A527, G90, lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper.

a. Galvanized Steel Sheet: 24 gage (0.0276 inch) (0.7010 mm).

3. Masonry Type: Provide with offset top flange for embedment in masonry mortar joints.

4. Counterflashing Wind-Restraint Clips: Provide hold down clips with 1/2 inch (12.7 mm) kickout to be installed before counterflashing to prevent wind uplift on the counterflashing lower edge. Fabricate the clips of the following materials:

a. Galvanized Steel: 22 gage; 0.0336 inch (0.8534 mm) thick.

D. Piping through roof box and T-tops:

1. Galvanized Steel: ASTM A 526-85, sheet steel with 1.25 oz./sq. (3.82 g/$m^2$) Galvwash surfacing.

a. Gauge: Twenty-four (24).

b. Solder: ASTM B32-89, alloy grade 50A. Neutralize flux after soldering.

2. T-Tops must be a minimum of 8” high and have sides and screens.

E. Work shall be in accordance with Architectural Sheet Metal Manual, as issued by Sheet Metal and Air Conditioning Contractors' National Association, Inc., (SMACNA).

## 2.13 MECHANICAL FASTENERS

A. Base sheet to wood deck:

1. Nails: Spiral or annular ring shank, twelve (12) gage minimum, with integral one (1) inch round metal cap.
2. Acceptable manufacturers:
    a. National Nail Corp., Grand Rapids, MI.
    b. Simplex Nails, Inc., Americus, GA.

B. Wood to wood:

1. Galvanized, common, annular ring nail.
2. Length: Sufficient to penetrate underlay blocking 1-1/4 inches (32 mm).

C. Wood to masonry:

1. Anchor bolts, 1/2 inch (12.7 mm) diameter with 5/8 inch (15.9 mm) washer.

D. Galvanized sheet steel to wood blocking:

1. FS FF-N-105B(3) Type II, Style 20, roofing nails; galvanized steel wire, flat head, diamond point, round, barbed shank.
2. Length: Sufficient to penetrate wood blocking 1-1/4 inches (32 mm) minimum.

E. Galvanized sheet steel to galvanized sheet metal (Counterflashing extensions):

1. Self-tapping sheet metal screws of 1/2 inch length and a minimum #3 diameter, with 5/8” steel/EPDM washer under head.

F. Termination bar to masonry:

1. Lead masonry anchors.
2. Length: Sufficient to provide 1-1/4 inches (32 mm) embedment minimum.

G. Drawband:

1. Gold Seal stainless steel worm gear clamp by Murray Corporation, Cockeysville, MD.
2. Power-Seal stainless steel worm drive clamps by Breeze Clamp Company, Saltsburg, PA.

## 2.14 COATING MATERIALS

A. Water-Based Primer: Water-based, polymer modified, asphalt primer with the following physical properties:

1. Asbestos Content, EPA 600/R13/116: None.
2. Non-Volatile Content, minimum, ASTM D 2823: 30 percent.

3. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 2 g/L.

B. White Roof Coating: Non-fibrated, semi-gloss, water-based acrylic roof coating, with the following physical properties:

1. Asbestos Content, EPA/600/R-93/116: None.
2. Non-Volatile Content (by weight), minimum, ASTM D 1644: 48.3 percent.
3. Volatile Organic Compounds (VOC), ASTM D 3960: <50 g/L.
4. Density at 77 deg F (25 deg. C) minimum, ASTM D 1475: 9.4 lbs/gal.
5. Reflectance, minimum, ASTM C 1549: 70 percent.
6. Emissivity, minimum, ASTM C 1370: 0.75.

## 2.15 WALKWAYS AND RUBBER BLOCKS

A. Walkway Pads: Mineral-granule-surfaced, reinforced asphaltic composition, slip-resisting pads, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, 1/2 inch thick, minimum, with the following physical properties:

1. Flexural Strength at max. load, minimum, ASTM C 203: 218 psi (1.5 kPa).
2. Granule adhesion (weight loss), maximum, ASTM D 4977: 1.1 gram.
3. Impact Resistance at 77 deg. F (25 deg. C), ASTM D 3746: No Damage to Roof.

B. Rubber Blocks: 100% rubber blocks with steel channels and reflective strips designed for supporting conduit.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Substrate inspection:

1. The Applicator shall inspect the substrate for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect the quality of work.
2. The substrate shall be clean, smooth, dry, free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing shall not start until all defects have been corrected.
3. Verify that roof openings and penetrations are in place and braced and that roof drains are securely clamped in place.
4. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that the nailers match thicknesses of insulation.
5. Use sheet metal to cover any irregularities in the wood deck.
6. Proceed with installation only after unsatisfactory conditions have been corrected.

7. All broken and disconnected conduits must be reattached and repaired by the Applicator.

## 3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Water test all roof drains prior to roof removal. Notify the District in writing of any plumbing problems, drainage issues, or leaks. Contractor must replace any broken or missing components including drain screens.

D. Protection:

1. Contractor shall be responsible for protection of property during course of work. Lawns, shrubbery, paved areas, and building shall be protected from damage. Repair damage at no extra cost to Owner.
2. Roofing, flashings, membrane repairs, and insulation shall be installed and sealed in a watertight manner on same day of installation or before arrival of inclement weather.
3. At start of each work day drains within daily work area shall be plugged. Plugs to be removed at end of each work day or before arrival of inclement weather.
4. Preparation work shall be limited to those areas that can be covered with installed roofing material on same day and before arrival of inclement weather.
5. Arrange work sequence to avoid use of newly constructed roofing for storage, walking surface, and equipment movement. Move equipment and ground storage areas as work progresses.
6. Protect building surfaces at set-up areas with tarpaulin. Secure tarpaulin. Spilled or scattered debris shall be cleaned up immediately. Removed material to be disposed from roof as it accumulates.
7. At end of each working day, seal removal areas with water stops along edges to prevent water entry.
8. Provide clean plywood walkways and take other precautions required to prevent tracking of aggregate/debris from existing membrane into new work area where aggregate/debris pieces can be trapped within new roofing membrane. Contractor shall instruct and police workmen to ensure that aggregate/debris is not tracked into new work areas on workmen's shoes or equipment wheels. Discovery of entrapped aggregate/debris within new membrane is sufficient cause for its rejection.

## 3.3 INSTALLATION, GENERAL

A. Install roofing system in accordance with manufacturer’s recommendations. Have specification and product data sheets on the job site.

B. Start installation of built-up roofing membrane in presence of roofing system manufacturer's technical personnel.

C. Cooperate with testing and inspecting agencies engaged or required to perform services for installing built-up roofing system.

D. Coordinate installing roofing system components so insulation and roofing membrane sheets are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing mastic with joints and edges sealed.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

E. Cold Process Asphalt Heating

1. An in-line heat exchange unit may be used to facilitate application
   a. Do not exceed maximum adhesive temperature of 100° F.
2. Heat exchange unit: Use heat transfer oil approved by heating equipment manufacturer.
3. Follow operation procedures recommended by heating equipment manufacturer.

F. Details not addressed in specification shall be in accordance with NRCA Manual Plates and recommendations, and the Architectural Sheet Metal Manual, as issued by Sheet Metal and Air Conditioning Contractors' National Association, Inc., (SMACNA).

## 3.4 BASE-SHEET INSTALLATION

A. Install lapped base-sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:

1. Mechanically fasten over red rosin sheet at 9 inches on center along the base ply 4 inch overlap and in two rows 18 inches on center equally spaced and staggered in the field of the sheet.
2. Adhere crickets in low rise foam adhesive over base sheet.

## 3.5 PLY SHEET INSTALLATION

A. Install two lapped course of roofing membrane ply sheet, extending sheet over and terminating beyond cants. Install in shingle fashion.

1. Adhere to base sheet in cold-applied base sheet adhesive at a rate of 2.5 gals/100 sq. ft. to form a uniform membrane without ply sheets touching.
2. Install a third ply sheet over all ridges and through all valleys and waterways.
3. Immediately broom each ply sheet with a ply width broom to insure full adhesion without voids.

B. Water test cricket lines, crickets behind curbs, and drain areas for ponding. Correct ponding greater than ¼" with additional cricket material. If ponding cannot be corrected with additional crickets, tear off roof area and reinstall with larger cricket material. Correct ponding less than 1/8" with additional ply sheets.

## 3.6 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

A. Install modified bituminous roofing membrane cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:

1. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
2. Embed cap sheet in cold-applied membrane adhesive applied at a rate of 2.0 gals/100 sq. ft.
3. Roll cap sheet with 75 lb roller to insure full adhesion.
4. Apply white granules to all bleed out and bitumen marks. Roofs must be left clean. Apply additional adhesive and white granules to any bitumen that has dried to insure full embedment.
5. Apply specified polyurethane sealant in the gap between edge metal and edge of modified membrane.

B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Install roofing membrane sheets so side and end laps shed water. Completely bond and seal laps, leaving no voids.

1. Repair tears and voids in laps and lapped seams not completely sealed.

## 3.7 FLASHING

A. General flashing requirements:

1. Elastomeric Flashing:
    a. Adhere elastomeric flashing sheet completely to flashing surface, cant, and roofing with flashing adhesive. Prime surface as required. Apply adhesive in full coverage to both the substrate and to the back side of the flashing membrane. Allow adhesive to dry to the touch.
    b. Apply consistent pressure to entire surface of elastomeric flashing sheet using a steel hand roller to achieve full adhesion of the sheet to the flashing substrate. Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 4 inches. Fully heat weld flashing laps.

c. Elastomeric flashing sheet width: Sufficient to extend at least 6 inches beyond toe of cant onto new roof.

d. Seal horizontal edge of elastomeric flashing sheet with a three-course application of liquid applied flashing system and fiberglass reinforcement. Prime substrate prior to three-course application.

e. Seal vertical edge under counterflashings with termination bar and butyl tape secured at 8” o.c..

f. Seal vertical edge at curbs with a skirt metal with TF tape secured at 8” o.c..

g. Do not caulk cut edges of elastomeric flashing sheet until they have been inspected by manufacturer’s representative.

2. Hot air heat welding of elastomeric flashing sheet:

a. Wipe both sides of lap surfaces to be joined with solvent approved by manufacturer.

b. Adjust welding equipment air temperature prior to start. Utilize steel roller or weighted wheel on automatic welding equipment to provide pressure on lap area during heat welding.

c. Maintain air nozzle temperature, nozzle speed, and lap pressure when joining laps together.

d. Test lap areas to assure proper bonding. Remove lap sample from the roof. When lap sample is cool, pull test lap apart. When torn, the reinforcing scrim should become exposed. Patch test areas with new elastomeric flashing sheet of the same color and style, using a minimum 2" lap area.

e. Wipe top of lap seams with approved solvent and apply silicone sealant. Tool sealant to a coved bead.

3. Base flashing height:

a. Not less than 8 inches without manufacturer’s written approval. If height of base flashing exceeds 30 inches, a battan bar with butyl tape must be installed at the midpoint of the sheet. Heat weld a strip of elastomeric flashing sheet over the batten bar.

4. Two-Ply Stripping for metal flanges:

a. Set flange in modified mastic. Seal flange with two stripping plies embedded in specified adhesive. Extend first ply a minimum 8 inches beyond flange and the second 14 inches. Carefully rub in the ply to insure complete adhesion.

B. Edge Detail:

1. Extend base sheet over nailers and envelope felts.

2. Prior to setting and nailing horizontal flanges of metal edge flashing, trowel 1/16 inch uniformly thick layer of modified mastic to roofing surface receiving metal flange.
3. Fabricate and install metal edge flashing with formed drip edge incorporating 3/4 inch lock.
4. Secure fascia bottom with 3/4 inch lock to continuous cleat secured with galvanized steel roofing nails or screws at 6 inches o.c. into the fascia. Insure minimum 1” penetration into nailer. Cleat shall be 1 gauge heavier than fascia and have a maximum flange width of 1 inch.
    a. Gap fascia ends 1/2 inch; overlap cleat joints - 1 inch. Set flange in modified mastic. Cover fascia ends with cover plate profiled to fascia. Set cover in elastomeric mastic; screw to wood blocking through gap between fascia joints.
5. Nail interior portion of flange to wood blocking or wood decking with 2” long galvanized steel roofing nails at 3 inches o.c., staggered ½”.
6. Prime metal flange with asphalt primer.
7. Install stripping for metal flanges as described in general flashing requirements section.

C. Gutter detail:

1. Fabricate a new 18” girth gutter, supported by brackets, reinforced with internal straps, and complete with outlet drainage tubes.
    a. 24 gauge metal gutter with kynar finish. District to select from standard color selection.
2. Extend a dry base sheet from roof surface edge down onto vertical face behind where gutter will be placed.
3. Mechanically attach 10 gauge gutter brackets using two 2” screws per bracket to the outside face of the wall 36 inches o. c.. Install gutter onto brackets and slope gutter to outlets. Powder coat brackets to match gutter.
4. Install 16 gauge galvanized internal straps every 36 inches o. c.
5. Apply sealant and lap gutter section joints 1 inch minimum and lap in the direction of flow so as not to impede the flow of water. Rivet 2 inches o. c. and cover with Polytape.
6. Install gutter expansion joints every 50 feet, minimum.
7. Install edge detail as described above without the continuous cleat.
8. Install 4 inch, 16 gauge steel downspouts supported by 10 gauge brackets leading to the ground to replace the existing downspouts. Powder coat to match coping.

D. Curb flashings:

1. Curbs must be a minimum of 18” from any other flashing detail and must be a minimum of 8” off the finished roof surface including crickets and tapered

insulation. Construct new curbs or add to curbs to achieve minimum height requirements.

2. Install elastomeric flashing sheet as described in general flashing requirements section.
3. Extend flashing sheet to completely cover solid topped curbs.
4. Secure top edge of flashing membrane to vertical substrate with skirt metal and one layer of butyl tape secured 8 inches o.c. maximum.
5. Wipe top of bar clean with metal cleaner. Prime metal surface to receive sealant with metal primer. Allow to dry.
6. Caulk top of bar with polyurethane sealant. Provide watershed. Tool neatly.
7. Seal all holes, screws, and penetrations on equipment with polyurethane sealant.

E. Wall flashings:

1. Minimum height of base flashing 8". Remove and install new counterflashings to insure minimum height is achieved at all roof areas.
2. Adhere cant strip to flashing base in a continuous application of adhesive.
3. Install elastomeric base flashing described in general flashing requirements section.
4. Secure top edge of flashing membrane to vertical substrate with termination bar and one layer of butyl tape secured 8 inches o.c. maximum.
5. Wipe top of bar clean with metal cleaner. Prime metal surface to receive sealant with metal primer. Allow to dry.
6. Caulk top of bar with polyurethane sealant. Provide watershed. Tool neatly.

F. Plumbing vents and pipe penetrations:

1. Penetrations must be a minimum of 18" from any other flashing detail and must be a minimum of 8" off the finished roof surface including crickets and tapered insulation.
2. Wedge plumbing vent and pipe penetrations tight against deck.
3. Seal base of penetrations with polyurethane mastic within 24 hours of cap installation.
4. Install manufacturer's liquid applied flashing system for penetrations. Prime substrates prior to flashing installation.
5. Install pelican hood, NRCA MB-15, for multiple pipes coming through the deck in the same location.

G. T-Tops:

1. Prime top and bottom of base and set in a bed of mastic.
2. Secure with screws at 4" o.c..

3. Install two (2) ply stripping for metal flanges as described in general flashing requirements section.

H. Roof Drains:

1. Install roof system as specified.
2. Install liquid applied flashing system over drain sumps and into the drain bowl. Clean and prime substrates prior to flashing installation.
3. Clamp roofing system and drain flashing with clamping ring. Insure bolts and washers are tight.
4. Test all drains for proper flow and water tightness. Correct defects.

I. Scupper drains:

1. Inspect nailers to assure proper attachment and configuration.
2. Install base and ply sheets as specified.
3. Install new 22 gauge galvanized scuppers set in a ¼" bed of fibrated mastic. Assure all box seams are closed and soldered.
4. Fasten flange of scupper every 3 inches o.c. staggered.
5. Prime at a rate of 200 sq. ft. per gallon.
6. Install two (2) ply stripping for metal flanges as described in general flashing requirements section.
7. Install base flashing as described in general flashing requirements extending through the scupper.
8. Install a face plate and seal the outside of the scupper with polyurethane sealant. Use colored sealant matching the color of the wall.

J. Overflow Scuppers:

1. Inspect nailers to assure proper attachment and configuration.
2. Install roof system and base flashing as specified.
3. Install new clad metal scupper. Assure all box seams sealed.
4. Fasten flange of scupper every 3 inches o.c. staggered.
5. Strip in and seal with elastomeric membrane.
6. Install a face plate and seal the outside of the scupper with polyurethane sealant. Use colored sealant matching the color of the wall.

K. Pipe/conduits sitting on roofs shall be set on and clamped to new rubber blocks with steel channels.

1. Support lines every 10 feet on pipe runs along with support on each side of every union, junction, and direction change.

## 3.8 COATING INSTALLATION

A. Allow roof system to cure 28 days after modified cap sheet installation. Power wash roof system to remove all debris.

B. Prime roof system at a rate of 300 square feet per gallon. Back roll primer.

C. Apply coating in two coats at 1.5 gallons per 100 sq. ft. per coat over roof system, flashings, and metal components.

1. Back roll coating to insure an even application over all surfaces.
2. Roofs to be left clean.

D. Fill in any bird baths with aliphatic urethane top coat.

## 3.9 WALKWAY INSTALLATION

A. Walkway Pads: Install walkway pads around all serviceable equipment and in path designated by District.

1. Set pads in a spot application of solvent free mastic.
2. Do not coat walkway pads.

## 3.10 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Owner.

B. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

## 3.11 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction, walls, conduit, mechanical equipment, and all other areas using cleaning agents and procedures recommended by manufacturer of affected construction.

SECTION CONTINUES

## 3.12 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____
of _____,
herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner:
2. Address:
3. Building Name/Type:
4. Address:
5. Area of Work:
6. Acceptance Date:
7. Warranty Period:
8. Expiration Date:

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
    a. lightning;
    b. peak gust wind speed exceeding 74 mph;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed by:

1. Authorized Signature:

2. Name:

3. Date:

END OF SECTION 07 52 16.13

# SECTION 07525

# SBS MODIFIED BITUMINOUS MEMBRANE ROOFING, COLD-APPLIED

# (RE-ROOF OF PORTABLES AND PERMANENT BUILDINGS)

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section Includes:

1. Tear-off and properly dispose of existing roof systems, insulations, roofing accessories, and metal flashings down to the decking over identified buildings.

2. Installation of Styrene-butadiene-styrene (SBS) modified bituminous membrane roofing system, including but not limited to:
   a. Roof insulation (as required to match existing).
      1) Polyisocyanurate insulation and a ½" wood fiber cover board.
   b. Crickets at all curbs, between drain points, and where necessary to provide a minimum 1/4:12 slope.
   c. Roof membrane and membrane base flashings.
      1) One Burmastic Composite Ply base sheet.
      2) Two Burmastic Glass Ply sheets.
      3) One Powerply Standard FR cap sheet.
      4) TPA flashings.
   d. T24 Color Coat coating.

### 1.3 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Cold Process Built Up Roofing – An asbestos free formulation of asphalt, solvent, thixotrope, mineral stabilizer and reinforcing fibers used as an interply adhesive.

C. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mopping application and 75 centipoise for mechanical application, within a range of plus or minus 25 deg F (14 deg C), measured at the mop cart or mechanical spreader immediately before application.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

C. Roofing Membrane System Load-Strain Properties: Provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following minimum load-strain properties at membrane failure when tested according to ASTM D 2523:

1. Tensile strain at failure, at 73 dg F: 490 lbf/in machine direction, minimum; 3.37% percent elongation, maximum.

2. Tensile strain at failure, at 73 dg F: 400 lbf/in cross-machine direction, minimum; 3.47% percent elongation, maximum.

D. Fire-Test-Response Characteristics: Provide roofing system that has a UL Class A fire rating.

E. Flashings and Fastening: Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with requirements and recommendations of the following:

1. FMG 1-49: Loss Prevention Data Sheet for Perimeter Flashings.

2. FMG 1-29 rev. May 2005: Loss Prevention Data Sheet for Above Deck Roof Components.

3. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.

4. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.

## 1.5 ACTION SUBMITTALS

A. Product Data and MSDS Sheets: For each type of product specified.

1. Highlight characteristics that confirm compliance with specified products.

B. Samples in the following quantities:

1. 3-by-5 inch sample of roof base sheet.

2. 3-by-5 inch sample of roof ply sheet.

3. 3-by-5 inch sample of roof cap sheet.

4. 3-by-5 inch sample of flashing membrane.

5. 3-by-5 inch sample of stripping ply.

## 1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Product Certificate: Submit letter, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.

B. Qualification Data: For Installer and Roofing Inspector. Include letter from Manufacturer written for this Project indicating approval.

C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of compliance with performance requirements, including roofing membrane system load/strain property test report.

2. Indicate that proposed system components are compatible.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of built-up roofing.

E. Warranties: Sample of special warranties.

F. Inspection Reports: Daily reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions taken to correct defective work.

1. Submit reports to the District and Architect daily.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For built-up roofing to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years experience installing similar work, and qualified by the manufacturer to furnish warranty of type specified.

1. Installer must acquire three inspection service days per school site utilizing manufacturer’s technical inspector. Inspector must be present for roof removal, deck preparation, base sheet installation, cap sheet installation, and coating installation.

B. Manufacturer Qualifications: A qualified manufacturer that is UL listed for built-up roofing identical to that used for this Project.

C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer’s compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.

D. Source Limitations: Obtain roofing system components from or approved in writing by roofing system manufacturer.

E. Exterior Fire-Test Exposure: UL Class A; as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

F. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, roofing Installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.

5. Review structural loading limitations of roof deck during and after roofing.

6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.

7. Review governing regulations and requirements for insurance and certificates if applicable.

8. Review temporary protection requirements for roofing system during and after installation.

9. Review roof observation and repair procedures after roofing installation.

## 1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

## 1.10 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Field measurements and material quantities:

1. Contractor shall have sole responsibility for accuracy of all measurements, estimates of material quantities and sizes, and site conditions that will affect work.

C. Waste Disposal:

1. Do not re-use, re-cycle or dispose of material manufacturers product containers except in accordance with all applicable regulations. The user of manufactured products is responsible for proper use and disposal of product containers.

2. Do not dispose of any materials in District containers.

D. Safety requirements:

1. All application, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.

2. Comply with federal, state, local and Owner fire and safety requirements.

3. Maintain a crewman as a floor area guard whenever roof decking is being repaired or replaced.

4. Maintain fire extinguisher within easy access whenever power tools, roofing kettles, fuels, solvents, torches, and open flames are being used.

## 1.11 WARRANTY

A. Warranty, General: Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Roof System Warranty, General: Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer:

1. Sheet metal flashing and trim, including roof penetration flashings.

2. Roof curbs, hatches, and penetration flashings.

3. Roof and parapet expansion joint assemblies.

C. Special Warranty: Manufacturer's standard or customized form, in which manufacturer agrees to repair or replace components of built-up roofing that fails in materials or workmanship within specified warranty period. One manufacturer must provide the warranty for all roof sections. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover boards, walkway products, and other components of built-up roofing.

2. Manufacturer will provide, at no cost to owner, the following services in Years 2, 5, 10, and 15:

a. Inspection by a Technical Representative and delivery of a written inspection report documenting roof conditions.

3. Warranty Period: 30 years from date of Substantial Completion.

D. Installer's Warranty: Submit roofing Installer's warranty, signed by Installer, covering the Work of this Section and related Sections indicated above, including all components of built-up roofing such as built-up roofing membrane, base flashing, roof insulation, fasteners, cover boards, metal panels, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL

A. Basis of Design: materials, manufacturer’s product designations, and/or manufacturer’s names specified herein shall be regarded as the minimum standard of quality required for work of this Section. All products are also ‘or equal’. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1 and performance requirements in Part 2.

B. Any materials substituted must be done 10 days prior to bid to allow for all contractors to bid the substituted product. All substitutions requested must be submitted with information required in substitution request form.

### 2.2 MANUFACTURERS

A. To be determined but must comply with the criteria in this specification.

## 2.3 BASE-SHEET MATERIALS

A. Base Sheet: Nonperforated, asphalt-coated, polyester/fiberglass/polyester reinforced sheet dusted with fine mineral surfacing on both sides which meets the requirements of ASTM D 4601, Type II, and the following properties:

1. Breaking Strength, minimum, ASTM D 146: machine direction, 130 lbf/in (22.5 kN/m); cross machine direction, 120 lbf/in (21.0 kN/m).

2. Tear Strength, minimum, ASTM D 4073: machine direction, 200 lbf (880 N); cross machine direction, 200 lbf (880 N).

3. Pliability, 1/2 inch (12.7 mm) radius bend, ASTM D 146: No failures.

4. Thickness, minimum, ASTM D 146: 0.05 inch (1.3 mm).

5. Weight, minimum, ASTM D 228: 30 lb/100 sq. ft. (1.4 kg/sq. m.).

## 2.4 ROOFING MEMBRANE PLY SHEETS

A. Ply Sheet: ASTM D 4601, Type II, nonperforated, asphalt-impregnated and coated glass-fiber sheet dusted with fine mineral surfacing on both sides, with the following properties:

1. Breaking Strength, minimum, ASTM D 146: machine direction, 90 lbf/in (15.7 kN/m); cross machine direction, 70 lbf/in (12.2 kN/m).

2. Pliability, 1/2 inch (12.7 mm) radius bend, ASTM D 146: No failures.

## 2.5 ROOFING MEMBRANE CAP SHEETS, SBS-MODIFIED BITUMEN

A. Roofing Membrane Cap Sheet: ASTM D 6163, Grade G, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Exterior Fire-Test Exposure, ASTM E 108: Class A.

2. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction 80.0 lbf/in (14.0 kN/m); cross machine direction 70.0 lbf/in (12.0 kN/m).

3. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction, 100 lbf (440 N); cross machine direction 100 lbf (440 N).

4. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction 7.5 percent; cross machine direction 7.5 percent.

5. Low Temperature Flex, maximum, ASTM D 5147: -15 deg. F (-26 deg. C).

6. Thickness, minimum, ASTM D 5147: 0.120 inch (3 mm).

## 2.6 FLASHING MATERIALS

A. Base Flashing Sheet: ASTM D 4434, Type IV, internally fabric reinforced, uniform, flexible TPA sheet, CRRC listed and California Title 24 Energy Code compliant.

1. Tensile Strength at 0 deg. F (-18 deg. C), minimum, ASTM D 6509: 300 lbf/in (52 kN/m).

2. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D 6509: 100 lbf (0.44 kN).

3. Elongation at 0 deg. F (-18 deg. C), minimum at fabric break, ASTM D 6509: machine direction, 25 percent; cross machine direction, 25 percent.

4. Thickness: 45 mils, nominal.

5. Exposed Face Color: White.

6. Reflectance, ASTM C 1549: 86 percent.

7. Thermal Emittance, ASTM C 1371: .86.

8. Solar Reflectance Index (SRI), ASTM E 1980: 108

B. Stripping/Target Ply Sheet: ASTM D 6162, Grade S, Type III, composite polyester and glass-fiber reinforced, SBS/SIS/SEBS-modified asphalt sheet; smooth surfaced; suitable for application method specified with the following properties:

1. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction 800 lbf/in (140 kN/m); cross machine direction 800 lbf/in (120 kN/m).

2. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction, 1300 lbf (5.7 kN); cross machine direction 1400 lbf (6.2 kN).

3. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 6 percent; cross machine direction, 6 percent.

4. Low Temperature Flex, ASTM D 5147: -40 deg. F (-40 deg. C).

5. Thickness: Minimum, ASTM D 5147: 0.100 inch (2.5 mm).

C. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type I.

D. Flashing Membrane Bonding Adhesive, Low VOC: Elastomeric, low-VOC solvent-based contact-type adhesive for bonding TPA fleece-backed single ply membranes and flashings to substrates.

1. Asbestos Content, EPA/600/R-93/116: None.

2. Density at 77 deg. F (25 deg. C), minimum, ASTM D 1475: 7.0 lb/gal (0.84 kg/L).

3. Percent solids: 25 percent minimum.

4. VOC, maximum, ASTM D 3960: 200 g/L.

E. Water-Based Asphalt Primer: Water-based, polymer modified, asphalt primer with the following physical properties:

1. Asbestos Content, EPA 600/R13/116: None.

2. Non-Volatile Content, minimum, ASTM D 2823: 30 percent.

3. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 2 g/L.

F. Asphalt Roofing Mastic: ASTM D 4586, Type II, Class 1, one-part, asbestos-free, cold-applied mastic specially formulated for compatibility and use with specified roofing membranes and flashings, with the following properties:

1. Asbestos Content, ASTM D 276: None.

2. Volatile Organic Compounds (VOC), maximum, ASTM D 6511: 234 g/L.

3. Nonvolatile Matter, minimum, ASTM D 4586: 85 percent.

4. Density at 77 deg. F (25 deg. C), ASTM D 1475: 9.5 lb/gal (1.15 kg/L).

5. Resistance to Sag, maximum, ASTM D 4586: 1/8 inch (3.1 mm).

6. Viscosity at 77 deg. F (25 deg. C), ASTM D 2196: 480,000 to 1,000,000 cP (480 to 1,000 Pa*s).

7. Moisture Vapor Transmission, ASTM E 398: 0.25 g/100 sq. in./24 hr at 0.020 in. thickness, average.

G. Fluid Applied Flashing System: ASTM D 7311, elastomeric, two-coat single-component moisture triggered polyurethane fluid-applied roofing formulated for application to structural concrete deck, with the following minimum physical properties:

1. Aliphatic Urethane Base Coat:

a. Asbestos Content, EPA/600/R-93/116: None.

b. Volatile Organic Compounds (VOC), ASTM D 3960: Not greater than 40 g/L.

c. Percent solids (by weight), ASTM D 1644: Not less than 85 percent.

2. Aliphatic Urethane Top Coat: UV-stabilized, chemical-resistant top coat:

a. Asbestos Content, EPA/600/R-93/116: None.

b. Volatile Organic Compounds (VOC), ASTM D 3960: Not greater than 45 g/L.

c. Elongation at break, ASTM D 7311: Not less than 340 percent

d. Tensile Strength, ASTM D 7311: Not less than 1,400 lbf/sq. in.

e. Tear Resistance, ASTM D 7311: Not less than 150 lbf/in.

f. Accelerated Weathering, 5000 hour, ASTM D 7311: Pass, no cracking or checking.

g. Percent solids (by weight), ASTM D 1353: Not less than 85 percent.

3. Fiberglass Reinforcement: Medium to fine fiber, rapid wetting chopped strand glass mat for fluid-applied membrane and flashing.

4. Polyurethane Mastic: Single component, high solids, moisture curing, aromatic polyurethane mastic.

5. Structural Concrete/Masonry Primer: Two-component, 100 percent solids, epoxy penetrating primer for concrete deck surfaces.

6. Metal Surface Primer: Single-component, water based primer to promote adhesion of base coat to metal surfaces.

7. Asphaltic Surfaces Primer: Single-component, multi-substrate primer to promote adhesion of base coat to surfaces recommended by manufacturer.

H. Flashing Sheet Stripping Adhesive: ASTM D 7311, elastomeric, two-coat single-component moisture triggered polyurethane fluid-applied roofing product, with the following minimum physical properties:

1. Asbestos Content, EPA/600/R-93/116: None.

2. Volatile Organic Compounds (VOC), ASTM D 3960: Not greater than 45 g/L.

3. Elongation at break, ASTM D 7311: Not less than 340 percent

4. Tensile Strength, ASTM D 7311: Not less than 1,400 lbf/sq. in.

5. Tear Resistance, ASTM D 7311: Not less than 150 lbf/in.

6. Accelerated Weathering, 5000 hour, ASTM D 7311: Pass, no cracking or checking.

7. Percent solids (by weight), ASTM D 1353: Not less than 85 percent.

I. Solvent-Free Elastomeric Roofing Mastic: One-part, solvent-free, asbestos-free, low-odor elastomeric roof mastic specially formulated for compatibility and use with specified roofing membranes and flashings, with the following properties:

1. Asbestos Content, EPA 600/R13/116: None.

2. Nonvolatile Matter, minimum, ASTM D 4586: 70 percent.

3. Elongation at 77 deg. F (25 deg. C), minimum, ASTM D 412: 1000 percent.

4. Recovery from 500 percent Elongation, minimum, ASTM D 412: 500 percent.

5. Flexibility at -40 deg. F (-40 deg. C), ASTM D 3111: No cracking.

J. Butyl Tape: manufacturer's term bar sealant.

K. General purpose sealant: Two component (1:1 ratio), solvent free, low odor urethane sealant that is asbestos free, extremely low in odor, quick setting, and does not contain any VOC's.

1. Density, ASTM D 1875: 8.8 lbs/gal.

2. Hardness, ASTM C 661: Shore A 40 – 44.

3. Tack Free Time, ASTM C 679: 30 – 40 minutes.

L. Urethane sealant: manufacturer's gun grade, moisture cured, one component polyurethane sealant.

1. Hardness (Shore A), ASTM C 920-02: 40.

2. Bond Durability, ASTM C 920-02: Pass.

3. Stain and Color Change, ASTM C 920-02: None.

4. Accelerated Weathering, ASTM C 920-02: Pass.

5. VOC, ASTM D 3960-02: 85 g/L.

M. Silicone sealant: manufacturer's low modulus, high performance, one part moisture curing silicone joint sealant.

1. Tensile Strength at maximum elongation, ASTM D 412-87: 200 psi.

2. Tear Resistance (Die C), ASTM D 624-86: 40 pli.

3. Stain and Color Change, ASTM C 510-77: None.

4. UV Resistance, ASTM C794-80: Excellent.

5. VOC, ASTM D 3960-02:0 g/L (less water, less exempt solvent)

N. Urethane Sealant Primer: One part, resin-based primer formulated to prepare concrete and masonry surfaces for the application of urethane sealants, with the following physical properties:

1. Non-Volatile Content, minimum, ASTM D 2369: 42 percent.

2. Flash Point, minimum, ASTM D 93: 94 deg. F (34 deg. C).

3. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 560 g/L.

4. Density at 77 deg. F (25 deg. C), minimum, ASTM D 1875: 8.0 lb/gal (950 g/L).

O. Urethane Sealant Primer: One part primer formulated to prepare metal and plastic surfaces for the application of urethane sealants, with the following physical properties:

1. Non-Volatile Content, minimum, ASTM D 2369: 5 percent.

2. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 233 g/L.

3. Density at 77 deg. F (25 deg. C), minimum, ASTM D 1875: 8.3 lb/gal (1000 g/L).

## 2.7 ADHESIVE MATERIALS

A. General: Adhesive and sealant materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Insulation, Cover Board, and Cricket Adhesive: ASTM D 312, Type IV, hot-melt asphalt, with the following physical properties:

1. Softening Point, min/max, ASTM D 36: 215-225 deg. F (102–107 deg. C).

2. Penetration at 77 deg. F (25 deg. C), min/max, ASTM D 5: 15-30 dmm.

3. Flash point, minimum, ASTM D 92: 525 deg. F (274 deg. C).

4. Ductility at 77 deg. F (25 deg. C), minimum, ASTM D 113: 2.5 cm.

C. Base, Ply and Cap Sheet Adhesive: One-part, asbestos-free, low-volatile, cold-applied adhesive specially formulated for compatibility and use with specified roofing membranes and flashings, with the following physical properties:

1. Asbestos Content, EPA 600 R-93/116: None.

2. Volatile Organic Compounds (VOC), maximum, ASTM D 6511: <250 g/L.

3. Nonvolatile Content, minimum, ASTM D 6511: 75 percent.

4. Flash Point, minimum, ASTM D 93: 100 deg. F (38 deg. C).

5. Density at 77 deg. F (25 deg. C), ASTM D 6511: 8.0 lb/gal (950 g/L).

6. Uniformity and Consistency, ASTM D 6511: Pass.

7. Asphalt Content, minimum, ASTM D 6511: 40 percent.

## 2.8 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.

B. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

C. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

## 2.9 ROOF INSULATION

A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, HCFC-free, with felt or glass-fiber mat facer on both major surfaces. Use individual pieces no greater than 2 ½” and 4’ x 4’ in size.

1. Thickness match existing R-Value.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes for sloping to drain and at transitions. Include on the high side of all curbs. Use individual pieces no greater than 2 ½” thick.

1. 1/4:12 inch slope min.

2. Polyisocyanurate cricket material with 1/2 inch thick wood-fiber cover board.

## 2.10 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

C. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

D. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

E. Cover Board: ASTM C 208, Type II, Grade 2, Cellulosic-fiber and water-resistant binders, asphalt coated on six sides and chemically treated for deterioration.

1. Thickness ½” inch

F. Substrate Board (over spaced sheathing or plank decks): ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate board.

1. Thickness ¼” inch

G. Substrate Joint Tape: 6- or 8-inch-(150- or 200-mm-) wide, coated, glass-fiber joint tape.

## 2.11 WOOD BLOCKING AND CURBS

A. Lumber:

1. Douglas Fur free from warping and visible decay; pressure-treated with chromated copper arsenate (CCA) to meet AWPB, LP-22, 0.40 retention, and marked.

a. Wood nailers: match insulation height x 6” minimum.

b. Curb height: minimum 8” off finished roof surface.

B. Woodfiber cant: 4” x 4”.

## 2.12 METAL FLASHINGS

A. Metal edge flashing:

1. Twenty-four (24) gauge Galvalume steel coated both sides with a layer of 55% aluminum-zinc alloy coated by the hot dip process per ASTM specification A792/A792M.
    a. Rise: 3/8".
    b. Fascia: extend 1" further down the fascia board than previous edge metal.
    c. Color to be selected by the Architect.

B. Termination bar:

1. Aluminum bar:
    a. 1/8 x 1 inch (3.2 x 25.4 mm).

C. Counterflashing and counterflashing extensions:

1. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.

2. Galvanized Steel Sheet: ASTM A526, G90, commercial quality, or ASTM A527, G90, lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper.
    a. Galvanized Steel Sheet: 24 gage (0.0276 inch) (0.7010 mm).

3. Masonry Type: Provide with offset top flange for embedment in masonry mortar joints.

4. Counterflashing Wind-Restraint Clips: Provide hold down clips with 1/2 inch (12.7 mm) kickout to be installed before counterflashing to prevent wind uplift on the counterflashing lower edge. Fabricate the clips of the following materials:
    a. Galvanized Steel: 22 gage; 0.0336 inch (0.8534 mm) thick.

D. Piping through roof box and T-tops:

1. Galvanized Steel: ASTM A 526-85, sheet steel with 1.25 oz./sq. (3.82 g/$m^2$) Galvwash surfacing.
    a. Gauge: Twenty-four (24).
    b. Solder: ASTM B32-89, alloy grade 50A. Neutralize flux after soldering.

2. T-Tops must be a minimum of 8" high and have sides and screens.

E. Work shall be in accordance with Architectural Sheet Metal Manual, as issued by Sheet Metal and Air Conditioning Contractors' National Association, Inc., (SMACNA).

## 2.13 MECHANICAL FASTENERS

A. Base sheet to wood deck:

1. Nails: Spiral or annular ring shank, twelve (12) gage minimum, with integral one (1) inch round metal cap.

2. Acceptable manufacturers:

a. National Nail Corp., Grand Rapids, MI.

b. Simplex Nails, Inc., Americus, GA.

B. Wood to wood:

1. Galvanized, common, annular ring nail.

2. Length: Sufficient to penetrate underlay blocking 1-1/4 inches (32 mm).

C. Wood to masonry:

1. Anchor bolts, 1/2 inch (12.7 mm) diameter with 5/8 inch (15.9 mm) washer.

D. Galvanized sheet steel to wood blocking:

1. FS FF-N-105B(3) Type II, Style 20, roofing nails; galvanized steel wire, flat head, diamond point, round, barbed shank.

2. Length: Sufficient to penetrate wood blocking 1-1/4 inches (32 mm) minimum.

E. Galvanized sheet steel to galvanized sheet metal (Counterflashing extensions):

1. Self-tapping sheet metal screws of 1/2 inch length and a minimum #3 diameter, with 5/8” steel/EPDM washer under head.

F. Termination bar to masonry:

1. Lead masonry anchors.

2. Length: Sufficient to provide 1-1/4 inches (32 mm) embedment minimum.

G. Drawband:

1. Gold Seal stainless steel worm gear clamp by Murray Corporation, Cockeysville, MD.

2. Power-Seal stainless steel worm drive clamps by Breeze Clamp Company, Saltsburg, PA.

## 2.14 COATING MATERIALS

A. Metal Primer: Water based acrylic metal primer that provides a tough, flexible film for the protection of steel against corrosion. Must be VOC compliant.

B. Metal Coating: Durable elastomeric acrylic resin weatherproofing coating that will accommodate metal roof movement.

1. Density, minimum, ASTM D 1475: 11.5 lb/gal.

2. Solids by weight, minimum, ASTM D 1353: 64%.

3. Elongation, minimum, ASTM D 2370: 475%.

4. Tensile strength, minimum, ASTM D 2370: 190 psi.

C. Water-Based Primer: Water-based, polymer modified, asphalt primer with the following physical properties:

1. Asbestos Content, EPA 600/R13/116: None.

2. Non-Volatile Content, minimum, ASTM D 2823: 30 percent.

3. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 2 g/L.

D. White Roof Coating: Non-fibrated, semi-gloss, water-based acrylic roof coating, with the following physical properties:

1. Asbestos Content, EPA/600/R-93/116: None.

2. Non-Volatile Content (by weight), minimum, ASTM D 1644: 48.3 percent.

3. Volatile Organic Compounds (VOC), ASTM D 3960: <50 g/L.

4. Density at 77 deg F (25 deg. C) minimum, ASTM D 1475: 9.4 lbs/gal.

5. Reflectance, minimum, ASTM C 1549: 70 percent.

6. Emissivity, minimum, ASTM C 1370: 0.75.

## 2.15 WALKWAYS AND RUBBER BLOCKS

A. Walkway Pads: Mineral-granule-surfaced, reinforced asphaltic composition, slip-resisting pads, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, 1/2 inch thick, minimum, with the following physical properties:

1. Flexural Strength at max. load, minimum, ASTM C 203: 218 psi (1.5 kPa).

2. Granule adhesion (weight loss), maximum, ASTM D 4977: 1.1 gram.

3. Impact Resistance at 77 deg. F (25 deg. C), ASTM D 3746: No Damage to Roof.

B. Rubber Blocks: 100% rubber blocks with steel channels and reflective strips designed for supporting conduit.

# PART 3 - EXECUTION

## 3.1 REMOVAL AND EXAMINATION

A. Remove and properly dispose of existing roofing, insulation, related roofing materials, flashings, abandon curbs and pipes, and any owner identified equipment to leave all portions of the building decks in a fit condition to have new roof system installed.

1. Install new supports and plywood decking where curbs and other penetrations are removed.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. All rotted or deteriorated decking shall be removed and replaced. Deck type and attachment shall conform to local code requirements.

1. Wood deck repairs:

a. Remove loose nails and pound down all high nails.

b. Reattach loose panels at 6 inches o.c. at edges; 12 inches o.c. at intermediate supports.

c. Remove deteriorated deck panels. Examine joists for rot. If unsound, contact Owner immediately for additional action.

d. Attach new decking 6 inches o.c. at edges; 12 inches o.c. at intermediate supports.

e. Provide 1/8 inch (3.2 mm) gap between panels at panel edges.

2. Steel deck repairs:

a. All rusted or deteriorated decking shall be brought to the attention of the Owner's Representative to determine method of treatment or replacement.

Surface-only rusted metal shall be sanded and treated with rust-inhibiting paint. Include this method in base bid for 10% of the decking. Sections that have rusted deeper than the surface or are not structurally sound shall be removed and replaced.

3. Concrete roof decks shall be smooth, even, free of dust, dirt, excess moisture or oil and be structurally sound. Sharp ridges, other projections and accumulations of bitumen above the surface shall be removed to ensure a smooth surface before roofing. Install minimum 100 mil thick self-adhering membrane over all joints and holes in the deck.

C. Substrate inspection:

1. The Applicator shall inspect the substrate for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect the quality of work.

2. The substrate shall be clean, smooth, dry, free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing shall not start until all defects have been corrected.

3. Verify that roof openings and penetrations are in place and braced and that roof drains are securely clamped in place.

4. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that the nailers match thicknesses of insulation.

5. Use sheet metal to cover any irregularities in the wood deck.

6. Proceed with installation only after unsatisfactory conditions have been corrected.

7. All broken and disconnected conduits must be reattached and repaired by the Applicator.

## 3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Water test all roof drains prior to roof removal. Notify the District in writing of any plumbing problems, drainage issues, or leaks. Contractor must replace any broken or missing components including drain screens.

D. Protection:

1. Contractor shall be responsible for protection of property during course of work. Lawns, shrubbery, paved areas, and building shall be protected from damage. Repair damage at no extra cost to Owner.

2. Roofing, flashings, membrane repairs, and insulation shall be installed and sealed in a watertight manner on same day of installation or before arrival of inclement weather.

3. At start of each work day drains within daily work area shall be plugged. Plugs to be removed at end of each work day or before arrival of inclement weather.

4. Preparation work shall be limited to those areas that can be covered with installed roofing material on same day and before arrival of inclement weather.

5. Arrange work sequence to avoid use of newly constructed roofing for storage, walking surface, and equipment movement. Move equipment and ground storage areas as work progresses.

6. Protect building surfaces at set-up areas with tarpaulin. Secure tarpaulin. Spilled or scattered debris shall be cleaned up immediately. Removed material to be disposed from roof as it accumulates.

7. At end of each working day, seal removal areas with water stops along edges to prevent water entry.

8. Provide clean plywood walkways and take other precautions required to prevent tracking of aggregate/debris from existing membrane into new work area where aggregate/debris pieces can be trapped within new roofing membrane. Contractor shall instruct and police workmen to ensure that aggregate/debris is not tracked into new work areas on workmen's shoes or equipment wheels. Discovery of entrapped aggregate/debris within new membrane is sufficient cause for its rejection.

## 3.3 INSTALLATION, GENERAL

A. Install roofing system in accordance with manufacturer’s recommendations. Have specification and product data sheets on the job site.

B. Start installation of built-up roofing membrane in presence of roofing system manufacturer's technical personnel.

C. Cooperate with testing and inspecting agencies engaged or required to perform services for installing built-up roofing system.

D. Coordinate installing roofing system components so insulation and roofing membrane sheets are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing mastic with joints and edges sealed.

2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.

3. Remove and discard temporary seals before beginning work on adjoining roofing.

E. Cold Process Asphalt Heating

1. An in-line heat exchange unit may be used to facilitate application

a. Do not exceed maximum adhesive temperature of 100° F.

2. Heat exchange unit: Use heat transfer oil approved by heating equipment manufacturer.

3. Follow operation procedures recommended by heating equipment manufacturer.

F. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mopping application and 75 centipoise for mechanical application, within a range of plus or minus 25 deg F (14 deg C), measured at the mop cart or mechanical spreader immediately before application.

G. Details not addressed in specification shall be in accordance with NRCA Manual Plates and recommendations, and the Architectural Sheet Metal Manual, as issued by Sheet Metal and Air Conditioning Contractors' National Association, Inc., (SMACNA).

## 3.4 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer's written instructions for installing roof insulation.

C. Install wood nailers to match insulation and cricket height at perimeters.

D. Installation:

1. Mechanically attach a red rosin sheet and the first layer of Polyisocyanurate insulation to nailable decks and the DensDeck roof board over spaced sheathing with screws and metal plates. Secure with 16 fasteners per board in the field, 24 fasteners per board along the perimeter, and 28 fasteners per board at the corners.

    a. Adhere first layer of Polyisocyanurate insulation to concrete decks with Premium IV asphalt at a rate of 30 lbs/square. Properly prepare and prime decks as required by manufacturer.

2. Cut boards to fit around curbs, wood blocking, penetrations, skylight frames, and all other deck projections. Fill all gaps greater than ¼".

E. Install additional layers of insulation, taper, crickets, and cover board over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches in each direction.

1. Set each layer of insulation in hot asphalt at rate of 30 lbs/100 sq. ft.

2. Immediately walk in insulation to insure full adhesion.

3. Fill all gaps greater than ¼".

4. Install tapered edge strips to insure a smooth transition between any deck changes or uneven areas.

## 3.5 BASE-SHEET INSTALLATION

A. Install lapped base-sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:

1. Plywood decks with no insulation:

    a. Mechanically fasten over red rosin sheet at 9 inches on center along the base ply 4 inch overlap and in two rows 18 inches on center equally spaced and staggered in the field of the sheet.

2. Over insulation and DensDeck:

    a. Adhere to substrate in cold-applied base sheet adhesive at a rate of 3.0 gals/100 sq. ft.

    b. Immediately broom or roll base sheet to insure full adhesion.

## 3.6 PLY SHEET INSTALLATION

A. Install two lapped course of roofing membrane ply sheet, extending sheet over and terminating beyond cants. Install in shingle fashion.

1. Adhere to base sheet in cold-applied base sheet adhesive at a rate of 2.5 gals/100 sq. ft. to form a uniform membrane without ply sheets touching.

2. Install a third ply sheet over all ridges and through all valleys and waterways.

3. Immediately broom each ply sheet with a ply width broom to insure full adhesion without voids.

B. Water test cricket lines, crickets behind curbs, and drain areas for ponding. Correct ponding greater than ¼” with additional cricket material. If ponding cannot be corrected with additional crickets, tear off roof area and reinstall with larger cricket material. Correct ponding less than 1/8” with additional ply sheets.

## 3.7 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

A. Install modified bituminous roofing membrane cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:

1. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.

2. Embed cap sheet in cold-applied membrane adhesive applied at a rate of 2.0 gals/100 sq. ft.

3. Roll cap sheet with 75 lb roller to insure full adhesion.

4. Apply white granules to all bleed out and bitumen marks. Roofs must be left clean. Apply additional adhesive and white granules to any bitumen that has dried to insure full embedment.

5. Apply specified polyurethane sealant in the gap between edge metal and edge of modified membrane.

B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Install roofing membrane sheets so side and end laps shed water. Completely bond and seal laps, leaving no voids.

1. Repair tears and voids in laps and lapped seams not completely sealed.

## 3.8 FLASHING

A. General flashing requirements:

1. Elastomeric Flashing:

a. Adhere elastomeric flashing sheet completely to flashing surface, cant, and roofing with flashing adhesive. Prime surface as required. Apply adhesive in full coverage to both the substrate and to the back side of the flashing membrane. Allow adhesive to dry to the touch.

b. Apply consistent pressure to entire surface of elastomeric flashing sheet using a steel hand roller to achieve full adhesion of the sheet to the flashing substrate. Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 4 inches. Fully heat weld flashing laps.

c. Elastomeric flashing sheet width: Sufficient to extend at least 6 inches beyond toe of cant onto new roof.

d. Seal horizontal edge of elastomeric flashing sheet with a three-course application of liquid applied flashing system and fiberglass reinforcement. Prime substrate prior to three-course application.

e. Seal vertical edge under counterflashings with termination bar and butyl tape secured at 8” o.c..

f. Seal vertical edge at curbs with a skirt metal with TF tape secured at 8” o.c..

g. Do not caulk cut edges of elastomeric flashing sheet until they have been inspected by manufacturer’s representative.

2. Hot air heat welding of elastomeric flashing sheet:

a. Wipe both sides of lap surfaces to be joined with solvent approved by manufacturer.

b. Adjust welding equipment air temperature prior to start. Utilize steel roller or weighted wheel on automatic welding equipment to provide pressure on lap area during heat welding.

c. Maintain air nozzle temperature, nozzle speed, and lap pressure when joining laps together.

d. Test lap areas to assure proper bonding. Remove lap sample from the roof. When lap sample is cool, pull test lap apart. When torn, the reinforcing scrim should become exposed. Patch test areas with new elastomeric flashing sheet of the same color and style, using a minimum 2" lap area.

e. Wipe top of lap seams with approved solvent and apply silicone sealant. Tool sealant to a coved bead.

3. Base flashing height:

a. Not less than 8 inches without manufacturer's written approval. If height of base flashing exceeds 30 inches, a battan bar with butyl tape must be installed at the midpoint of the sheet. Heat weld a strip of elastomeric flashing sheet over the batten bar.

4. Two-Ply Stripping for metal flanges:

a. Set flange in modified mastic. Seal flange with two stripping plies embedded in specified adhesive. Extend first ply a minimum 8 inches beyond flange and the second 14 inches. Carefully rub in the ply to insure complete adhesion.

B. Edge Detail:

1. Install nailers to match insulation.

2. Extend base sheet over nailers and envelope felts.

3. Prior to setting and nailing horizontal flanges of metal edge flashing, trowel 1/16 inch uniformly thick layer of modified mastic to roofing surface receiving metal flange.

4. Fabricate and install metal edge flashing with formed drip edge incorporating 3/4 inch lock.

5. Secure fascia bottom with 3/4 inch lock to continuous cleat secured with galvanized steel roofing nails or screws at 6 inches o.c. into the fascia. Insure minimum 1" penetration into nailer. Cleat shall be 1 gauge heavier than fascia and have a maximum flange width of 1 inch.

a. Gap fascia ends 1/2 inch; overlap cleat joints - 1 inch. Set flange in modified mastic. Cover fascia ends with cover plate profiled to fascia. Set cover in elastomeric mastic; screw to wood blocking through gap between fascia joints.

6. Nail interior portion of flange to wood blocking or wood decking with 2" long galvanized steel roofing nails at 3 inches o.c., staggered ½".

7. Prime metal flange with asphalt primer.

8. Install stripping for metal flanges as described in general flashing requirements section.

C. Gutter detail:

1. Fabricate a new 18" girth gutter, supported by brackets, reinforced with internal straps, and complete with outlet drainage tubes.

a. 24 gauge metal gutter with kynar finish. District to select from standard color selection.

2. Extend a dry base sheet from roof surface edge down onto vertical face behind where gutter will be placed.

3. Mechanically attach 10 gauge gutter brackets using two 2” screws per bracket to the outside face of the wall 36 inches o. c.. Install gutter onto brackets and slope gutter to outlets. Powder coat brackets to match gutter.

4. Install 16 gauge galvanized internal straps every 36 inches o. c.

5. Apply sealant and lap gutter section joints 1 inch minimum and lap in the direction of flow so as not to impede the flow of water. Rivet 2 inches o. c. and cover with Polytape.

6. Install gutter expansion joints every 50 feet, minimum.

7. Install edge detail as described above without the continuous cleat.

8. Install 4 inch, 16 gauge steel downspouts supported by 10 gauge brackets leading to the ground to replace the existing downspouts. Powder coat to match coping.

D. Curb flashings:

1. Curbs must be a minimum of 18” from any other flashing detail and must be a minimum of 8” off the finished roof surface including crickets and tapered insulation. Construct new curbs or add to curbs to achieve minimum height requirements.

2. Install elastomeric flashing sheet as described in general flashing requirements section.

3. Extend flashing sheet to completely cover solid topped curbs.

4. Secure top edge of flashing membrane to vertical substrate with skirt metal and one layer of butyl tape secured 8 inches o.c. maximum.

5. Wipe top of bar clean with metal cleaner. Prime metal surface to receive sealant with metal primer. Allow to dry.

6. Caulk top of bar with polyurethane sealant. Provide watershed. Tool neatly.

7. Seal all holes, screws, and penetrations on equipment with polyurethane sealant.

E. Wall flashings:

1. Minimum height of base flashing 8”. Remove and install new counterflashings to insure minimum height is achieved at all roof areas.

2. Adhere cant strip to flashing base in a continuous application of adhesive.

3. Install elastomeric base flashing described in general flashing requirements section.

4. Secure top edge of flashing membrane to vertical substrate with termination bar and one layer of butyl tape secured 8 inches o.c. maximum.

5. Wipe top of bar clean with metal cleaner. Prime metal surface to receive sealant with metal primer. Allow to dry.

6. Caulk top of bar with polyurethane sealant. Provide watershed. Tool neatly.

F. Plumbing vents and pipe penetrations:

1. Penetrations must be a minimum of 18” from any other flashing detail and must be a minimum of 8” off the finished roof surface including crickets and tapered insulation.

2. Wedge plumbing vent and pipe penetrations tight against deck.

3. Seal base of penetrations with polyurethane mastic within 24 hours of cap installation.

4. Install manufacturer’s liquid applied flashing system for penetrations. Prime substrates prior to flashing installation.

5. Install pelican hood, NRCA MB-15, for multiple pipes coming through the deck in the same location.

G. T-Tops:

1. Prime top and bottom of base and set in a bed of mastic.

2. Secure with screws at 4” o.c..

3. Install two (2) ply stripping for metal flanges as described in general flashing requirements section.

H. Roof Drains:

1. Install roof system as specified.

2. Install liquid applied flashing system over drain sumps and into the drain bowl. Clean and prime substrates prior to flashing installation.

3. Clamp roofing system and drain flashing with clamping ring. Insure bolts and washers are tight.

4. Test all drains for proper flow and water tightness. Correct defects.

I. Scupper drains:

1. Inspect nailers to assure proper attachment and configuration.

2. Install base and ply sheets as specified.

3. Install new 22 gauge galvanized scuppers set in a ¼" bed of fibrated mastic. Assure all box seams are closed and soldered.

4. Fasten flange of scupper every 3 inches o.c. staggered.

5. Prime at a rate of 200 sq. ft. per gallon.

6. Install two (2) ply stripping for metal flanges as described in general flashing requirements section.

7. Install base flashing as described in general flashing requirements extending through the scupper.

8. Install a face plate and seal the outside of the scupper with polyurethane sealant. Use colored sealant matching the color of the wall.

J. Overflow Scuppers:

1. Inspect nailers to assure proper attachment and configuration.

2. Install roof system and base flashing as specified.

3. Install new clad metal scupper. Assure all box seams sealed.

4. Fasten flange of scupper every 3 inches o.c. staggered.

5. Strip in and seal with elastomeric membrane.

6. Install a face plate and seal the outside of the scupper with polyurethane sealant. Use colored sealant matching the color of the wall.

K. Pipe/conduits sitting on roofs shall be set on and clamped to new rubber blocks with steel channels.

1. Support lines every 10 feet on pipe runs along with support on each side of every union, junction, and direction change.

## 3.9 COATING INSTALLATION

A. Coat all sheet metal pans, vents, counterflashings, and other metal components with metal coating. Properly prepare surfaces per manufacturer's written instructions and prime with metal primer.

1. Seal all fastener heads, seams, and holes over metal with polyester backed butyl tape prior to coating.

B. Allow roof system to cure 28 days after modified cap sheet installation. Power wash roof system to remove all debris.

C. Prime roof system at a rate of 300 square feet per gallon. Back roll primer.

D. Apply coating in two coats at 1.5 gallons per 100 sq. ft. per coat over roof system, flashings, and metal components.

1. Back roll coating to insure an even application over all surfaces.

2. Roofs to be left clean.

E. Fill in any bird baths with aliphatic urethane top coat.

## 3.10 WALKWAY INSTALLATION

A. Walkway Pads: Install walkway pads around all serviceable equipment and in path designated by District.

1. Set pads in a spot application of solvent free mastic.

2. Do not coat walkway pads.

## 3.11 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Owner.

B. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

## 3.12 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction, walls, conduit, mechanical equipment, and all other areas using cleaning agents and procedures recommended by manufacturer of affected construction.

SECTION CONTINUES

## 3.13 ROOFING INSTALLER'S WARRANTY

A. WHEREAS_____

of_____,
herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner:
2. Address:
3. Building Name/Type:
4. Address:
5. Area of Work:
6. Acceptance Date:
7. Warranty Period:
8. Expiration Date:

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
    a. lightning;
    b. peak gust wind speed exceeding 74 mph;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;

e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;

f. vapor condensation on bottom of roofing; and

g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed by:

1. Authorized Signature:

2. Name:

3. Date:

END OF SECTION

# SECTION 08110

# HOLLOW METAL

## PART 1 - GENERAL

### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide hollow metal doors, frames and related work, complete.

A. Work In This Section: Principal items include:

1. Hollow metal doors.
2. Hollow metal frames.
3. Louvers and frames for glazed lights in doors.
4. Galvanized finish for exterior and toilet room doors and frames.

B. Related Work Not In This Section:

1. Installation of hollow metal doors.
2. Furnishing finish hardware for hinged metal doors.
3. Louvers in walls.

### 1.02 QUALITY ASSURANCE:

A. Tolerances: Provide door and frame assemblies having maximum 3/32” gap between top and side edges of door face and frame after installation, and maximum 1/4" clearance above finish floor except as otherwise required by floor finish material; provide maximum 3/32” gap between door edges at meeting stiles of pairs of doors.

B. Where new doors are scheduled for existing frames, make a detailed survey of existing frames. Determine frame size, hardware locations and condition of stops, and fabricate new doors to fit existing frames and conditions. If existing frames are damaged, replace the frames.

C. Conform to SDI 100 for details not specified herein.

D. Doors shall be extra heavy duty, unless otherwise specified.

### 1.03 SUBMITTALS:

A. Shop Drawings: Submit shop drawings fully detailing materials, finishes, sizes, profiles, mouldings, location of hardware items with reinforcement and methods for anchoring, assembly and erection.

B. Samples: Submit the following samples:

1. Frame door construction.

2. Door panel and edge construction.
3. Door louvers.

C. Certification: Provide certification that the doors, frames and related hardware complies with requirements of Title 24 CCR, Section 5317 for air infiltration limitations.

PART 2 – PRODUCTS

2.01 TYPES:

A. Doors: SD-1-100 Grade II H.D., 18 gauge.

B. Door Frames: F16-4, welded frames.

2.02 MATERIALS:

A. Sheet Steel: ASTM A 568, cold rolled, commercial quality.

2.03 FABRICATION:

A. Verify sizes required and specified with existing conditions prior to installation. Make all necessary alterations to fit frames into existing openings as required to fit openings at not additional cost to the Owner.

B. Types: Sizes, types, thicknesses, profiles, details and features shown for doors and frames govern. In all other respects, provide doors and frames as standard with manufacturer except as specified herein.

C. Hollow Metal Doors: Flush panel seamless type with minimum 18 gauge steel 1-piece face panels, all parts welded and finished flush and smooth. Reinforce face panels with internal welded steel stiffeners, or bond to a plastic-treated honeycomb core to a foamed plastic core. Fill hollow core doors with mineral wood or equivalent material to eliminate all metallic ring. Top and bottom of the doors shall be closed with 14 gauge steel channel welded to door stiles at 6” centers. Reinforce the top, bottom and both edges according to manufacturer’s standards. Finish both face panels and all edges smooth and free of seams and distortion. Provide 1-3/4” by 12 gauge full-height astragal on active leaf of pairs of doors.

1. Louvers: Inverted chevron steel louver units for interior doors, stormproof blade profile type with removable framed bronze or aluminum insect screens on interior side for exterior doors.

D. Hollow Metal Frames: Form stops integral with frames. Reinforce heads over 42” side with a full-length 12 gauge channel. Provide steel plaster guards back of cutouts for hinges or mortised hardware for frames to be installed in plaster.

1. Fabricate frames of following gauges unless otherwise shown or specified:

   Interior openings – minimum 16 gauge steel.
   Exterior openings – minimum 14 gauge steel.

2. Fabrication: Fabricate all frames with welded joints, all exposed welds ground smooth and flush.

3. Fabricate new transom bards and new mullions for existing frames where indicated. Match profile of existing. Use material of gauge specified herein or heavier. Continuously weld new members to existing, and grind welds smooth.

E. Frame Anchors: Provide steel anchors of proper type for wall construction and 18 gauge minimum, each anchor prepared for not less than two fasteners where connected to wall studs, not less than three anchors per jamb except, if frame height exceeds 84", add one additional anchor for each additional 18" of frame height or fraction thereof. Provide anchors welded into frames except provide adjustable type frame anchors for frames installed in masonry. Provide floor anchors where mortar setting beds or concrete floor fill occurs.

1. Where new frames are anchored to existing construction, secure with flat head screws in dimpled holes at not over 18" o.c. Tackwell fasteners to frame, grind smooth, fill with bondo and prep for painting.

2. Where new frames are anchored to new construction, secure with flat head screws in dimpled holes at not over 18" o.c. Tackwell fasteners to frame, grind smooth, fill with bondo and prep for painting.

F. Hardware Preparation: Prepare, reinforce, mortise, drill and top doors and frames according to templates specified in Section 08710, reinforcing as standard with door and frame manufacturer except minimum 10 gauge steel behind butts and 12 gauge steel for mortised or surface-applied hardware. Conform to ANSI A 115 Series as applicable to the hardware specified in Section 08710 unless otherwise indicated.

G. Finish:

1. Exterior doors and frames and toilet room doors and frames: Thoroughly clean metal surfaces and chemically treat. Sand exposed surfaces of hollow metal and accessories and make smooth with mineral filler as required. Apply galvanized finish, after fabrication, on exterior doors and frames. Galvanizing shall conform to coating class G90.

2. Interior: Thoroughly clean metal surfaces and chemically treat for paint adhesion. Paint inaccessible surfaces before assembling. Sand exposed surfaces of hollow metal and accessories and make smooth with mineral filler as required. Apply a backed-on coat of manufacturer's standard rust inhibitive primer; include all concealed surfaces of door frames and anchors.

PART 3 – EXECUTION

3.01 INSTALLATION OF DOOR FRAMES:

A. Set frames as shown on approved shop drawings.

B. Plumb, align and brace frames securely until permanent anchors are set. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint. Use wood spreaders at bottom of frame if the shipping spreader is removed. Protect frame from accidental abuse. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.

C. Floor Anchors: Anchor the bottom of door frames to floor with two 1/4-inch diameter expansion bolts.

D. Jamb Anchors: Secure anchors to sides of steel studs with 3 screws through anchor tabs.

E. Grouting: Frames in plaster walls shall be solidly filled with plaster. Frames in gypsum wallboard walls shall be spot grouted as recommended by gypsum wallboard manufacturer.

1. Exterior doors frames shall have the bottom filled with a minimum of 8 inches of grout. Two No. 3 rebar shall be at the base of each side of door. Where no access occurs, provide an access opening in frame for grout installation. Weld opening with plate of frame thickness, flush, grind smooth, bondo and prep for paint.

3.02 INSTALLATION OF DOORS:

Refer to Section 06200.

END OF SECTION

# SECTION 08710

# DOOR HARDWARE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes**:**

1. Door hardware.
2. Storefront and entrance door hardware.
3. Gate Hardware.
4. Battery-powered electronic credential access control locks and panic hardware lever trim.

B. Related Divisions**:**

1. Division 06 – door hardware installation
2. Division 07 – sealant at exterior thresholds
3. Division 08 – metal doors and frames, wood doors, storefront and glazed curtainwall systems.
4. Division 21 – fire and life safety systems
5. Division 28 – security access systems

C. Specific Omissions**:** Hardware for the following is specified or indicated elsewhere.

1. Windows.
2. Cabinets, including open wall shelving and locks.
3. Signs.
4. Toilet accessories, including grab bars.
5. Installation.
6. Rough hardware.
7. Welded steel gates and supports.

### 1.2 REFERENCES**:**

A. Use date of standard in effect as of Bid date.

1. American National Standards Institute – ANSI 156.18 – Materials and Finishes.
   a) ANSI A156.18 Materials and Finishes
2. BHMA – Builders Hardware Manufacturers Association
3. DHI – Door and Hardware Institute
4. NFPA – National Fire Protection Association
   a) NFPA 80 – Fire Doors and Windows
   b) NFPA 105 – Smoke and Draft Control Door Assemblies
   c) NFPA 252 – Fire Tests of Door Assemblies
5. UL – Underwriters Laboratories
   a) UL10C – Positive Pressure Fire Tests of Door Assemblies.
   b) UL 305 – Panic Hardware

6. WHI – Warnock Hersey Incorporated State of California Building Code
7. Local applicable codes
8. SDI – Steel Door Institute
9. WI – Woodwork Institute
10. AWI – Architectural Woodwork Institute
11. NAAMM – National Association of Architectural Metal Manufacturers

B. Abbreviations

1. Manufacturers**:** see table at 2.1.A of this section
2. Finishes**:** see 2.7 of this section.

1.3 SUBMITTALS & SUBSTITUTIONS

A. SUBMITTALS**:** Submit six copies of schedule per Section 01330. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Minimum 10pt font size. Include following information**:**

1. Type, style, function, size, quantity and finish of hardware items.
2. Use BHMA Finish codes per ANSI A156.18.
3. Name, part number and manufacturer of each item.
4. Fastenings and other pertinent information.
5. Location of hardware set coordinated with floor plans and door schedule.
6. Explanation of abbreviations, symbols, and codes contained in schedule.
7. Mounting locations for hardware.
8. Door and frame sizes, materials and degrees of swing.
9. List of manufacturers used and their nearest representative with address and phone number.
10. Catalog cuts.
11. Point-to-point wiring diagrams.
12. Manufacturer’s technical data and installation instructions for electronic hardware.
13. Date of jobsite visit.

B. Bid and submit manufacturer’s updated/improved item if scheduled item is discontinued.

C. Deviations**:** Highlight, encircle or otherwise identify deviations from “Schedule of Finish Hardware” on submittal with notations clearly designating those portions as deviating from this section.

D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.

E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.

F. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.

G. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, riser and point-to-point wiring diagrams, manufacturers’ installation, adjustment and maintenance information, and supplier’s final inspection report.

1.4 QUALITY ASSURANCE:

A. Qualifications:

1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.

a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

D. Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C / UBC Standard 7-2 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.

E. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.

F. Pre-Installation Meetings: Initiate and conduct with supplier, installer and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware and door closers in the meetings. Convene prior to commencement of related work.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Delivery: coordinate delivery to appropriate locations (shop or field).

1. Permanent keys and cores: secured delivery direct to Owner's representative.

B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.

C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION:

A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.

B. Coordination**:** Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information**:**

1. Location of embedded and attached items to concrete.
2. Location of wall-mounted hardware, including wall stops.
3. Location of finish floor materials and floor-mounted hardware.
4. At masonry construction, coordinate with the anchoring and hollow metal supplier prior to frame installation by placing a strip of insulation, wood, or foam, on the back of the hollow metal frame behind the rabbet section for continuous hinges, as well as at rim panic hardware strike locations, silencers, coordinators, and door closer arm locations. When the frame is grouted in place, the backing will allow drilling and tapping without dulling or breaking the installer's bits.
5. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
6. Coordinate: flush top rails of doors at outswinging exteriors, and throughout where adhesive-mounted seals occur.
7. Manufacturers' templates to door and frame fabricators.

C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.

D. Environmental considerations**:** segregate unused recyclable paper and paper product packaging, uninstalled metals, and plastics, and have these sent to a recycling center.

E. Prior to submittal, carefully inspect existing conditions to verify finish hardware required to complete Work, including sizes, quantities, existing hardware scheduled for re-use, and sill condition material. If conflict between the specified/scheduled hardware and existing conditions, submit request for direction from Architect. Include date of jobsite visit in the submittal.

1. Submittals prepared without thorough jobsite visit by qualified hardware expert will be rejected as non-compliant.

1.7 WARRANTY**:**

A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties**:**

| | | |
|---|---|---|
| 1. | Locksets: | Three years |
| 2. | Extra Heavy Duty Cylindrical Lock: | Seven Years |
| 3. | Exit Devices: | Three years mechanical<br>One year electrical |
| 4. | Closers: | Ten years mechanical<br>Two years electrical |
| 5. | Hinges: | One year |
| 6. | Other Hardware | Two years |

1.8 COMMISSIONING:

A. Conduct these tests prior to request for certificate of substantial completion:

1. With installer present, test door hardware operation with climate control system while in full operation.
2. With installer, access control contractor and electrical contractor present, test electrical, electronic hardware systems for satisfactory operation.
3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

1.9 REGULATORY REQUIREMENTS:

A. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1008.1.9.2 and 1133B.2.5.2.

1. Locate panic hardware between 36 inches to 44 inches above the finished floor.

B. Handles, pull, latches, locks, other operating devices: readily openable from egress side without tight grasping, tight pinching, or twisting of the wrist to operate. California Building Code 1133B.2.5.2.

C. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per California Building Code, Section 1133B.2.5 and 1008.1.3, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.

D. Adjust door closer sweep periods so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door, per California Building Code Section 1133B.2.5.1.

E. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per California Building Code Section 1133B.2.6.

F. Door opening clear width no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and the hardware projects no more than 4 inches. California Building Code Section 1133B.2.2, 1133B.2.3, and 1008.1.1.

1. Exception: doors not requiring full passage through the opening, that is, to spaces less than 24 inches in depth, may have the clear opening width reduced to 20 inches. Example: shallow closets.

G. Door opening clear height no less than 80 inches measured from top of sill to bottom of frame header stop. Projections into clear opening height not to exceed 4 inches. California Building Code Section 1133B.2.2 and 1008.1.1.

H. Thresholds**:** floor or landing no more than 0.50 inches below the top of the threshold of the doorway. Change in level between 0.25 inches and 0.50 inches**:** beveled to slope no greater than 1**:**2 (50 percent slope). California Building Code Section 1133B.2.4.1.

I. Floor stops**:** Do not locate in path of travel. Locate no more than 4 inches from walls, per DSA Policy #99-08 (Access).

J. Meet California Building Code Sections 1133B.2, and 1008.1.

K. Exit Devices**:**

1. Panic hardware shall comply with CBC Section 1008.1.9 (consider that if the device is mounted lower than 36 inches AFF, the clear opening may be restricted to less than the 32 inches required clear opening). Panic bar shall be mounted 36 inches to 44 inches above finished floor surface.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: these will be considered; submit for review products with equivalent function and features of scheduled products.

| ITEM: | MANUFACTURER: | ACCEPTABLE ALTERNATE: |
|---|---|---|
| Hinges | (IVE) Ives | Bommer, Stanley |
| Continuous Hinges | (IVE) Ives | Select, Markar |
| Key System | (SCH) Schlage | District standard |
| Mechanical Locks | (SCH) Schlage | District standard |
| Electronic Locks | (SCE) Schlage Electronics | District standard |
| Exit Devices | (VON) Von Duprin | District standard |
| Closers | (LCN) LCN | District standard |
| Auto Flush Bolts | (IVE) Ives | DCI, Trimco |
| Coordinators | (IVE) Ives | DCI, Trimco |
| Silencers | (IVE) Ives | Rockwood, Trimco |
| Push & Pull Plates | (IVE) Ives | Rockwood, Trimco |
| Kickplates | (IVE) Ives | Rockwood, Trimco |
| Stops | (IVE) Ives | Rockwood, Trimco |
| Overhead Stops | (GLY) Glynn-Johnson | ABH, Rixson |
| Thresholds | (NGP) NGP | Zero, Reese, Pemko |
| Seals & Bottoms | (NGP) NGP | Zero, Reese. Pemko |
| Key Cabinets | (LUN) Lund | TelKee |

### 2.2 HINGING METHODS:

A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.

B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.

C. Conventional Hinges**:** Steel or stainless steel pins and concealed bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.

1. Outswinging exterior doors**:** non-ferrous with non-removable (NRP) pins.

D. Continuous Hinges**:**

1. Geared-type aluminum.

a) Use wide-throw units where needed for maximum degree of swing, advise architect if commonly available hinges are insufficient.
b) If units are used at storefront openings, color-coordinate hinge finish with storefront color. Custom anodizing and custom powdercoat finishes subject to Architect approval.

2. Pinned steel/stainless steel type**:** continuous stainless steel, 0.25-inch diameter stainless-steel hinge pin.

a) Use engineered application-specific wide-throw units as needed to provide maximum swing degree of swing, advise architect if required width exceeds 8 inches.

## 2.3 LOCKSETS, LATCHSETS, DEADBOLTS**:**

A. Mortise Locksets and Latchsets**:** as scheduled.

1. Chassis**:** cold-rolled steel, handing field-changeable without disassembly.
2. Universal lock case – 10 functions in one case.
3. Floating mounting tabs automatically adjusts to fit a beveled door edge.
4. Latchbolts**:** 0.75 inch throw stainless steel anti-friction type.
5. Lever Trim**:** through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.

a) Spindles**:** security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
b) Inside lever applied by screwless shank mounting – no exposed trim mount screws.
c) Levers rotate up or down for ease of use.

6. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
7. Thumbturns**:** accessible design not requiring pinching or twisting motions to operate.
8. Deadbolts**:** stainless steel 1-inch throw.
9. Electric operation**:** Manufacturer-installed continuous duty solenoid.
10. Strikes**:** 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
11. Scheduled Lock Series and Design**:** Schlage L series, 06N design.

12. Certifications:

a) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
b) ANSI/ASTM F476-84 Grade 31 UL Listed.

## 2.4 EXIT DEVICES / PANIC HARDWARE

A. General features:

1. Independent lab-tested 1,000,000 cycles.
2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.
3. Deadlocking latchbolts, 0.75 inch projection.
4. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
5. No exposed screws to show through glass doors.
6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
7. Releasable in normal operation with 15-pound maximum operating force per UBC Standard 10-4, and with 32-pound maximum pressure under 250-pound load to the door.
8. Exterior doors scheduled with XP-series devices: Static load force resistance of at least 2000 pounds.
9. Comply with CBC Section 1008.1.10.

B. Specific features:

1. Lever Trim: breakaway type, forged brass or bronze escutcheon min. 0.130 inch thickness, compression spring drive, match lockset lever design.
2. Fire-Labeled Devices: UL label indicating “Fire Exit Hardware”.
3. Electrically Operated Devices: Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.
4. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.

## 2.5 CLOSERS

A. Surface Closers: [4040XP]

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
1. ISO 2000 certified. Units stamped with date-of-manufacture code.
2. Independent lab-tested 10,000,000 cycles.
3. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
4. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.

5. Adjustable to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per California Building Code, Section 1133B.2.5 and 1008.1.3, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
6. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
7. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
8. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
9. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.
10. Non-flaming fluid, will not fuel door or floor covering fires.
11. Pressure Relief Valves (PRV) not permitted.

## 2.6 OTHER HARDWARE

A. Automatic Flush Bolts: Low operating force design.

B. Overhead Stops: Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

C. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

D. Door Stops: Provide stops to protect walls, casework or other hardware.

1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.
2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.

E. Thresholds: As scheduled and per details. Comply with CBC Section 1133B.2.4.1. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.

1. Saddle thresholds: 0.125 inches minimum thickness.
2. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Minimum 0.25 inch diameter fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).
3. Fire-rated openings, 90-minutes or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, request direction from Architect.
4. Acoustic openings: Set units in full bed of Division-7-compliant sealants, leave no air space between threshold and substrate.
5. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.

6. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.

F. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Leave no unfilled/uncovered pre-punched silencer holes. Intent: door bears against silencers, seals make minimal contact with minimal compression – only enough to effect a seal.

2.7 FINISH:

A. Generally: BHMA 626 Satin Chromium.

1. Areas using BHMA 626: furnish push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise scheduled.

B. Door closers: factory powder coated to match other hardware, unless otherwise noted.

2.8 KEYING REQUIREMENTS:

A. Key System: Schlage Primus high-security utility-patented keyway, interchangeable core throughout. Key blanks available only from factory-direct sources, not available from after-market keyblank manufacturers. For estimate use factory GMK charge. Initiate and conduct meeting(s) with Owner and I-R Security Technologies representatives to determine system keyway(s), keybow styles, structure, stamping, degree of physical security and degree of geographic exclusivity. Furnish Owner's written approval of the system; do not order keys or cylinders without written confirmation of actual requirements from the Owner. Owner will install permanent cylinders/cores.

1. Existing factory-registered master key system.
2. Primus Level 3G
3. Construction keying: furnish temporary keyed-alike cores. Remove at substantial completion and install permanent cylinders/cores in Owner's presence. Demonstrate that construction key no longer operates.
4. Temporary cylinders/cores remain supplier's property.
5. Furnish 10 construction keys.
6. Furnish 2 construction control keys.
7. Key Cylinders: furnish 6-pin solid brass construction.

B. Cylinders/cores: keyed at factory of lock manufacturer where permanent records are maintained. Locksets and cylinders same manufacturer.

C. Permanent keys: use secured shipment direct from point of origination to Owner.

1. For estimate: 3 keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys.
2. For estimate: VKC stamping plus "DO NOT DUPLICATE".

D. Bitting List: use secured shipment direct from point of origination to Owner at completion.

## PART 3 - EXECUTION

### 3.1 ACCEPTABLE INSTALLERS:

A. Can read and understand manufacturers' templates, suppliers' hardware schedule and printed installation instructions. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

### 3.2 PREPARATION:

A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation. Installation denotes acceptance of wall/frame condition.

A. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.

1. Notify Architect of code conflicts before ordering material.
1. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1008.1.9.2 and 1133B.2.5.2.
2. Locate panic hardware between 36 inches to 44 inches above the finished floor.
3. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.

B. Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

C. Existing frames and doors to be retrofitted with new hardware:

1. Field-verify conditions and dimensions prior to ordering hardware. Fill existing hardware cut outs not being reused by the new hardware. Remove existing hardware not being reused, return to Owner unless directed otherwise.
2. Remove existing floor closers not scheduled for reuse, fill cavities with non-shrinking concrete and finish smooth.
3. Cut and weld existing steel frames currently prepared with 2.25 inch height strikes. Cut an approximate 8 inch section from the strike jamb and weld in a reinforced section to accommodate specified hardware's strike.
4. Patch and weld flush filler pieces into existing door hardware preparations in steel doors and frames, leave surfaces smooth.
5. Glue in solid wood block fillers to fill cut outs in existing wood doors, sand surfaces smooth. Alternatively, use an approved epoxy-based wood filler product, submit product data for approval.

## 3.3 INSTALLATION

A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.

1. Gaskets**:** install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.
3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.
4. Replace fasteners damaged by power-driven tools.

B. Locate floor stops no more that 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.

C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.

D. Locate overhead stops for minimum 90 degrees at rest and for maximum allowable degree of swing.

E. Drill pilot holes for fasteners in wood doors and/or frames.

F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

G. Field-verify existing conditions and measurements prior to ordering hardware. Fill existing hardware cut outs not being used by the new hardware.

H. Remove existing hardware not being reused. Tag and bag removed hardware, turn over to Owner.

I. Where existing wall conditions will not allow door to swing using the scheduled hinges, provide wide-throw hinges and if needed, extended arms on closers.

J. Provide manufacturer's recommended brackets to accommodate the mounting of closers on doors with flush transoms.

## 3.4. ADJUSTING

A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.

1. Hardware damaged by improper installation or adjustment methods**:** repair or replace to Owner's satisfaction.
2. Adjust doors to fully latch with no more than 1 pound of pressure.
3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.
4. Adjust door closers per 1.9 this section.

B. Fire-rated doors:

1. Wood doors: adjust to 0.125 inches clearance at heads, jambs, and meeting stiles.
2. Steel doors: adjust to 0.063 inches minimum to 0.188 inches maximum clearance at heads, jambs, and meeting stiles.
3. Adjust wood and steel doors to 0.75 inches maximum clearance (undercut) above threshold or finish floor material under door.

C. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:

1. Has re-adjusted hardware.
2. Has evaluated maintenance procedures and recommend changes or additions, and instructed Owner's personnel.
3. Has identified items that have deteriorated or failed.
4. Has submitted written report identifying problems.

3.5 DEMONSTRATION:

A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.6 PROTECTION/CLEANING:

A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.

B. Clean adjacent wall, frame and door surfaces soiled from installation / reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE

A. See door schedule in drawings for hardware set assignments.

B. Hardware Schedule

HARDWARE SET: 01 - SINGLE DOOR EXTERIOR FROM CLASSROOM (EXIT DEVICE)

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 157XY | US28 | IVE |
| 1 | EA | PANIC HARDWARE | CD-XP-99-NL-OP-110MD | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057-ICX | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061-ICX | 626 | SCH |
| 2 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | ARMOR COLLAR | K-24 | 626 | KEE |
| 1 | EA | DOOR PULL | VR910 NL | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4040XP EDA TBWMS | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B4E | 630 | IVE |
| 1 | EA | FLOOR STOP | FS18S | BLK | IVE |

| | | | | | |
|---|---|---|---|---|---|
| 1 | SET | SEALS | 700NA | CL | NGP |
| 1 | EA | DOOR SWEEP | 200NA | CL | NGP |
| 1 | EA | THRESHOLD | PER SILL DETAIL | AL | NGP |

INSTALL SEAL BEFORE CLOSER AND STRIKE.

HARDWARE SET: 02 - SINGLE DOOR EXTERIOR FROM CLASSROOM (MORTISE LOCKSET)

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 157XY | US28 | IVE |
| 1 | EA | CLASSROOM SECURITY | L9071T 06N L283-711 (2.0 INDICATOR) | 626 | SCH |
| 2 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP EDA TBWMS | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B4E | 630 | IVE |
| 1 | EA | FLOOR STOP | FS18S | BLK | IVE |
| 1 | SET | SEALS | 700NA | CL | NGP |
| 1 | EA | DOOR SWEEP | 200NA | CL | NGP |
| 1 | EA | THRESHOLD | PER SILL DETAIL | AL | NGP |

INSTALL HEAD SEAL BEFORE CLOSER.

HARDWARE SET: 03 - PAIR DOORS - EXTERIOR FROM CORRIDOR

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 2 | EA | CONT. HINGE | 157XY | US28 | IVE |
| 1 | EA | KEYED REMOVABLE MULLION | KR4954-MT54 | 689 | VON |
| 1 | EA | PANIC HARDWARE | CD-XP-99-EO | 626 | VON |
| 1 | EA | PANIC HARDWARE | CD-XP-99-NL-OP-110MD | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057-ICX | 626 | SCH |
| 3 | EA | MORTISE CYLINDER | 20-061-ICX | 626 | SCH |
| 4 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | ARMOR COLLAR | K-24 | 626 | KEE |
| 1 | EA | DOOR PULL | VR910 DT | 630 | IVE |
| 1 | EA | DOOR PULL | VR910 NL | 630 | IVE |
| 2 | EA | SURFACE CLOSER | 4040XP EDA TBWMS | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 12" X 2" LDW B4E | 630 | IVE |
| 2 | EA | FLOOR STOP | FS18S | BLK | IVE |
| 1 | SET | SEALS | 700NA | CL | NGP |
| 2 | EA | DOOR SWEEP | 200NA | CL | NGP |
| 1 | EA | THRESHOLD | PER SILL DETAIL | AL | NGP |

INSTALL HEAD SEAL BEFORE CLOSER.

HARDWARE SET: 04 - SINGLE DOOR - CORRIDOR FROM SINGLE OCCUPANCY OFFICE (MORTISE LOCK)

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 3CB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | OFFICE/ENTRY LOCK | L9050T 06N L583-363 | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP EDA TBWMS | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B4E | 630 | IVE |
| 1 | EA | FLOOR STOP | FS436/FS438 (AS REQ.) | 626 | IVE |
| 1 | EA | SEAL | 137NA | AL | NGP |

HARDWARE SET: 05 - SINGLE DOOR INTERIOR MULTI-STALL RESTROOMS (STUDENTS)

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 3CB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | CLASSROOM DEAD LOCK | L9463T XB11-720 | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | PUSH PLATE | 8200 6" X 16" | 630 | IVE |
| 1 | EA | PULL PLATE | 8302 10" 6" X 16" G | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4041 DEL TBWMS | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B4E | 630 | IVE |
| 1 | EA | MOP PLATE | 8400 4" X 1" LDW B4E | 630 | IVE |
| 1 | EA | FLOOR STOP | FS436/FS438 (AS REQ.) | 626 | IVE |
| 1 | SET | SEALS | 700NA | CL | NGP |
| 1 | EA | DOOR SWEEP | 200NA | CL | NGP |
| 1 | EA | THRESHOLD | PER SILL DETAIL | | |

HARDWARE SET: 06 - SINGLE DOOR, INTERIOR STAFF RESTROOM (SINGLE OCCUPANCY)

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 3CB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | FAC RESTRM W/IND | L9486T 06L L583-363 L583375 | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | 626 | SCH |
| 2 | EA | BLANK KEY | 35-102 (EMERGENCY KEY) | 468 | SCH |
| 1 | EA | SURFACE CLOSER | 4041 DEL TBWMS | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B4E | 630 | IVE |
| 1 | EA | MOP PLATE | 8400 4" X 1" LDW B4E | 630 | IVE |
| 1 | EA | FLOOR STOP | FS436/FS438 (AS REQ.) | 626 | IVE |
| 1 | SET | SEALS | 700NA | CL | NGP |
| 1 | EA | DOOR SWEEP | 200NA | CL | NGP |
| 1 | EA | THRESHOLD | PER SILL DETAIL | | |

WHEN THUMB TURN IS THROWN ON THE INSIDE, ALL KEYS ARE LOCKED OUT EXCEPT AN EMERGENCY KEY.

HARDWARE SET: 07 - SINGLE DOOR - EXTERIOR UTILITY

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 157XY | US28 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06LLL 06N L283-150 | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | ARMOR COLLAR | K-24 | 626 | KEE |
| 1 | EA | DOOR PULL | VR900 | 630 | IVE |

| | | | | | |
|---|---|---|---|---|---|
| 1 | EA | SURFACE CLOSER | 4040XP EDA TBWMS | 689 | LCN |
| 1 | EA | FLOOR STOP | FS18S | BLK | IVE |
| 1 | SET | SEALS | 700NA | CL | NGP |
| 1 | EA | DOOR SWEEP | 200NA | CL | NGP |
| 1 | EA | THRESHOLD | PER SILL DETAIL | AL | NGP |

INSTALL HEAD SEAL BEFORE CLOSER.

END OF SECTION

# Catalog Cuts

for

BURBANK UNIFIED SCHOOL DISTRICT
BURBANK UNIFIED SCHOOL DISTRICT STANDARDS

Sorted by DHI Sequence

Prepared By
RICK MIRELES
ALLEGION, PLC
1520 BRIDGEGATE DRIVE, SUITE 100

DIAMOND BAR CALIFORNIA
Phone 909-809-2738

Created 4/15/2014

# Catalog Cut Summary

| Mfr | Description | Catalog Number | Cut | Page Number |
|---|---|---|---|---|
| IVE | CONT. HINGE | 157XY | IVE_0274 | |
| IVE | HINGE | 3CB1 4.5 X 4.5 | IVE_0248 | |
| VON | KEYED REMOVABLE MULLION | KR4954-MT54 | VON_AUX_014~VON_AUX_015~VON_AUX_016 | |
| SCH | FAC RESTRM W/IND | L9486T 06L L583-363 L583375 | SCH_0011 | |
| SCH | CLASSROOM SECURITY | L9071T 06N XL12-751 | SCH_0011 | |
| SCH | CLASSROOM DEAD LOCK | L9463T XB11-720 | SCH_0011 | |
| SCH | OFFICE/ENTRY LOCK | L9050T 06N L583-363 | SCH_0011 | |
| SCH | STOREROOM LOCK | L9080T 06LLL 06N L283-150 | SCH_0011 | |
| VON | PANIC HARDWARE | CD-XP-99-NL-OP-110MD | VON_XP | |
| VON | PANIC HARDWARE | CD-XP-99-EO | VON_XP | |
| SCH | RIM CYLINDER | 20-057-ICX | SCH_CYL_FSIC | |
| SCH | MORTISE CYLINDER | 20-061-ICX | SCH_CYL_FSIC | |
| SCH | PRIMUS CORE | 20-740 | SCH_CYL_FSIC | |
| SCH | FSIC CORE | 23-030 | SCH_CYL_FSIC | |
| SCH | BLANK KEY | 35-102 | | |
| KEE | ARMOR COLLAR | K-24 | KEE_K24 | |
| IVE | DOOR PULL | VR910 NL | IVE_0225 | |
| IVE | DOOR PULL | VR900 | IVE_0224 | |
| IVE | PUSH PLATE | 8200 6" X 16" | IVE_0127 | |
| IVE | PULL PLATE | 8302 10" 6" X 16" G | IVE_0128~IVE_5002 | |
| IVE | DOOR PULL | VR910 DT | IVE_0225 | |
| LCN | SURFACE CLOSER | 4040XP EDA TBWMS | LCN_4040XP | |
| LCN | SURFACE CLOSER | 4041 DEL TBWMS | LCN_4040 | |
| IVE | KICK PLATE | 8400 12" X 2" LDW B4E | IVE_0223 | |
| IVE | MOP PLATE | 8400 4" X 1" LDW B4E | IVE_0223 | |
| IVE | FLOOR STOP | FS18S | IVE_0131 | |
| IVE | FLOOR STOP | FS436 | IVE_0227 | |
| NGP | SEALS | 700NA | NGP_0058 | |
| NGP | SEAL | 137NA | NGP_0054 | |
| NGP | DOOR SWEEP | 200NA | NGP_0070 | |
| NGP | THRESHOLD | PER SILL DETAIL | | |
| | THRESHOLD | PER SILL DETAIL | | |

IVES®

# *157XY Adjustable Continuous Hinge*



Introducing a patented solution
that allows lateral and vertical adjustment
**after** the hinge is secured to door and frame.

The new Ives 157XY is a heavy duty, easy-to-install full surface continuous hinge that can be used on standard hollow metal, minimum reveal, narrow-faced frames, and narrow stile aluminum doors in aftermarket or new construction applications. The 157XY is the only hinge that allows all lateral and vertical clearances to be adjusted **after** the hinge is secured to the door and frame, reducing installation time to a fraction of what is required with any other hinge. The 157XY makes door repair work faster and enables more efficient maintenance through the life of the opening.

The Ives FOCUS™ bearing system delivers greater performance and reliability than conventional bearing systems. Patented technology securely keys bearings to the cover and to each other to eliminate the internal flexing and grinding that occur in high abuse applications. All bearings are centered at the mid-height of the door which allows them to be more effective when supporting heavier doors. FOCUS delivers maximum lateral strength at the top and bottom of the door where it's most needed while allowing the hinge to flex with bowed doors and frames without binding. This also enables easy on-site trimming without cutting off bearings and compromising 157XY load-carrying capacity.



FOCUS™
centralized bearing system

Improved aesthetics



**Features and Benefits**

- Compatible with hollow metal, minimum reveal, narrow-faced frames, and narrow stile doors
- Patented design allows for both lateral and vertical adjustability after the hinge is secured to door and frame
- FOCUS™ centralized bearing system allows for easy field modification and provides greater strength to the top and bottom of the hinge to prevent door sag.
- Contour of hinge covers give the door and frame a clean aesthetic look

**Configuration**

- Full surface hinge with 1/16" door insert
- Available in 83", 95", or 119" lengths
- 37 flex-resistant, self-lubricating centered bearings
- Tamper resistant interlocking leaves
- Hardened and plated #12 hex head steel self drilling and tapping screws

Ingersoll Rand
Security Technologies



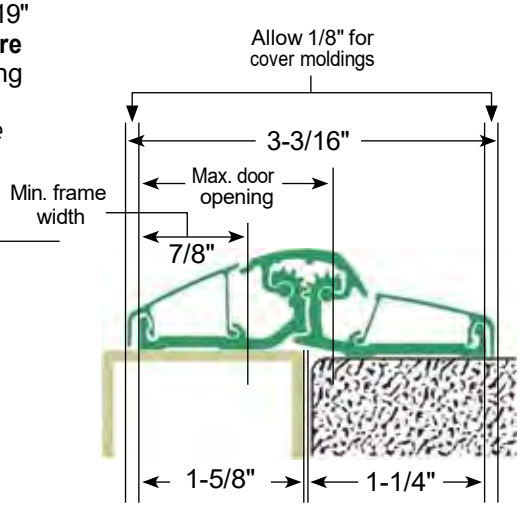
## 157XY Full Surface, Center Pivot Aluminum Geared Continuous Hinge

- Non Handed
- Narrow Frame
- 1/16" Door Inset
- 48" Maximum Door Width
- Beveled or Square Edge Doors

For Doors Weighing up to 550 pounds

Standard lengths 83", 95", 119"
**Standard Mounting Hardware**
12-24 X 1/2" Steel Self Drilling and Tapping Screws,
*Optional Wood Screws Available*

**Finishes**
Clear (CL), Dark Bronze (DB)




| Model | Description | Finish | Length | BHMA Finish |
|---|---|---|---|---|
|  | **157XY Heavy Duty** Adjustable Full Surface 1/16" Inset Non handed | US 28 | 83" | 628 |
| | | | 95" | |
| | | | 119" | |
| | | 313AN | 83" | 710 |
| | | | 95" | |
| | | | 119" | |


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# Full Mortise Hinges - 3 Knuckle

## 3PB1

3 Knuckle, Plain Bearing



**PLAIN BEARING • LOW FREQUENCY • STANDARD WEIGHT**

For use on Standard Weight Doors with Low Frequency Usage, not intended for use with door closing devices

**3PB1** Steel with steel pin
**3PB1** Brass with stainless steel pin
**3PB1** Stainless steel with stainless steel pin (630 finish only)

- Dimensions & tolerances conform to ANSI - A156.7
- 3PB1 Steel description conforms to ANSI - A8133
- 3PB1 Stainless description conforms to ANSI - A5133
- 3PB1 Brass description conforms to ANSI - A2133
- Packed with wood and machine screws

| Size (Inches) | Size (mm) | Gauge |
|---|---|---|
| 4.5 x 4 | 114 x 102 | 0.134 |
| 4.5 x 4.5 | 114 x 114 | 0.134 |

## 3CB1

3 Knuckle, Concealed Bearing



**CONCEALED BEARING • MEDIUM FREQUENCY • STANDARD WEIGHT**

For use on Standard Weight Doors with Medium Frequency Usage

**3CB1** Steel with steel pin
**3CB1** Brass with stainless steel pin
**3CB1** Stainless steel with stainless steel pin (630 finish only)
NRP = Non-Removable Pin

- Dimensions & tolerances conform to ANSI - A156.7
- 3CB1 Steel description conforms to ANSI - A8112
- 3CB1 Stainless description conforms to ANSI - A5112
- 3CB1 Brass description conforms to ANSI - A2112
- Packed with wood and machine screws

| Size (Inches) | Size (mm) | Gauge |
|---|---|---|
| 4.5 x 4 | 114 x 102 | 0.134 |
| 4.5 x 4.5 | 114 x 114 | 0.134 |

## 3CB1HW

3 Knuckle, Concealed Bearing, Heavy Weight



**CONCEALED BEARING • HIGH FREQUENCY • HEAVY WEIGHT**

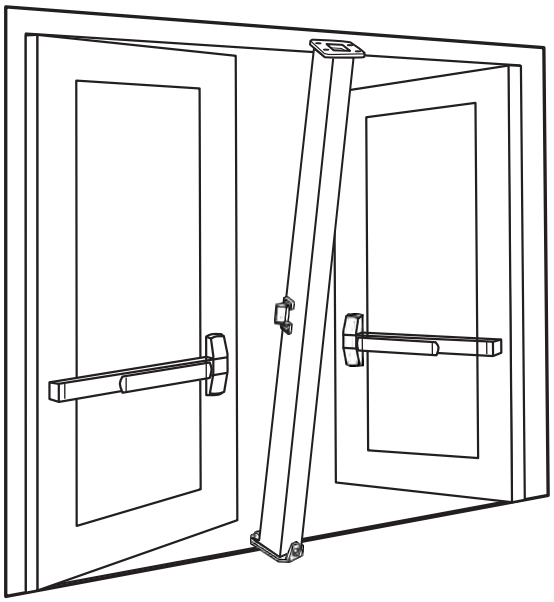
For use on Heavy Weight Doors or High Frequency Usage

**3CB1HW** Steel with steel pin
**3CB1HW** Brass with stainless steel pin
**3CB1HW** Stainless steel with stainless steel pin (630 finish only)
NRP = Non-Removable Pin

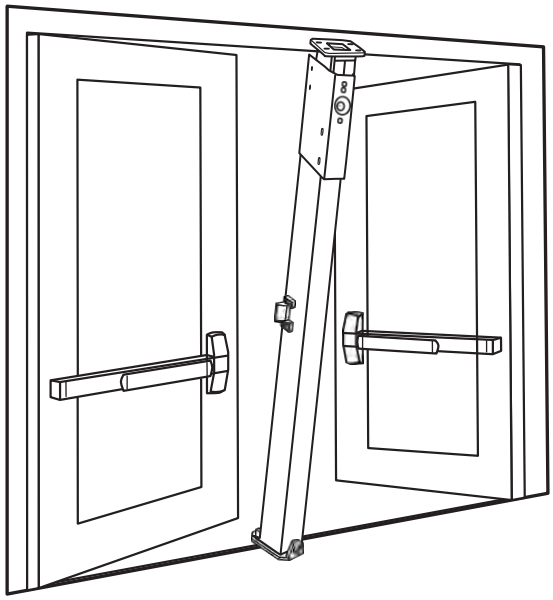
- Dimensions & tolerances conform to ANSI - A156.7
- 3CB1HW Steel description conforms to ANSI - A8111
- 3CB1HW Stainless description conforms to ANSI - A5111
- 3CB1HW Brass description conforms to ANSI - A2111
- Packed with wood and machine screws

| Size (Inches) | Size (mm) | Gauge |
|---|---|---|
| 4.5 x 4 | 114 x 102 | 0.180 |
| 4.5 x 4.5 | 114 x 114 | 0.180 |
| 5 x 4.5 | 127 x 114 | 0.190 |

## Removable Mullions



## Keyed Removable Steel Mullions



## Mullions

**Removable Steel Mullions** Mullions provide single door performance in double door openings with rim devices. Mullions are easily removed by loosening bottom set screw and removing top fitting cover. The top mullion fitting is attached to the frame and is concealed by the fitting cover.

Steel mullions are 2´´*(51mm)* wide and 3´´*(76mm)* deep, with a wall thickness of 1/8´´ *(3mm)*.

Mullions are shipped with mounting screws and prepared for strikes. Strikes are not included except where indicated.

Steel mullions are available in SP28 and SP313 finishes. Consult factory for other powder coat finish options.

**KR – Keyed Removable Steel Mullions** makes removal faster and easier by a single operation of the mortise cylinder. Once mullion is removed, large equipment or furniture can freely pass through the opening. The unit will self lock when re-installed, without use of the cylinder key. Uses a 1 1/4´´ mortise cylinder with a straight cam (Schlage cam reference B502-191). Cylinders are sold separately. Prefix mullion model with "KR".

**Removeable Aluminum Mullions** are 1 1/16´´ *(27mm)* wide on face closest to the door and 2 3/8´´ *(60mm)* at the widest point. The depth is 3 1/8´´ *(79mm)* with a wall thickness of 1/8´´ *(3mm)*.

Aluminum mullions are available in US4, US10, US28, 313AN and 315AN finishes. Consult factory for other powder coat finish options.

**Stock Hollow Metal Applications** for devices mounted to cover ANSI 161 cutouts are higher than the standard mullion strike location. Consult the factory for special strike preparation or order a blank mullion. See below.

**Blank Mullions** are furnished without strike preparation. They are used to mount devices at a strike height different from the standard mullion preparation.

**To Order, specify**

1. For keyed Removable option on steel mullions, prefix model number with "KR"
2. Model number.
3. Height of opening
4. Finish
5. Handing if required.
6. Centerline deviation (refer to device template for standard centerline).
7. Strikes, when required, should be ordered with device.
8. For keyed Removable option on steel mullions, prefix model number with "KR"


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## Steel Mullions

**1654** Prepared for two 1606 strikes. **If 1606 strikes are not specified on the order, two per mullion will be added. Additional charges apply.**

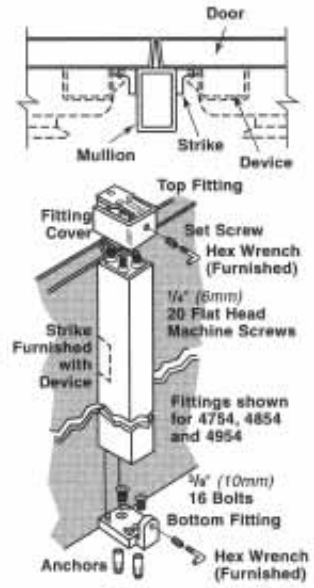
**4954** Prepared for 264 or 299 strikes. For use with all Von Duprin Panic rim devices. **Note: specify strike choice with device.**

**9954** Prepared for and must be used with two 268 strikes (88-F device), or two 499F (22-F, 98-F, 99F devices). UL fire labeled mullion for up to 3 hour opening using Von Duprin fire exit rim devices. This mullion is not easily removed due to special fittings.

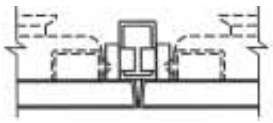
22-F and 88-F devices are rated up to 8´ x 8' *(2438mm x 2438mm).*

98-F and 99-F devices are rated up to 10´0´´*(3048mm)*.

**Note: If 268 or 499F strikes are not specified on the order, two per mullion will be added. Additional charges apply.**

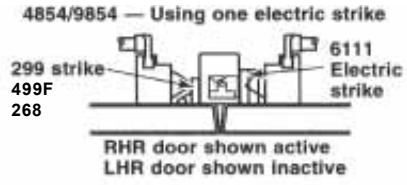



**4754** Prepared for two 4263 monitor strikes.



**4854** Prepared for one 299 and one 6111 electric strike. Indicate handing for electric strike.

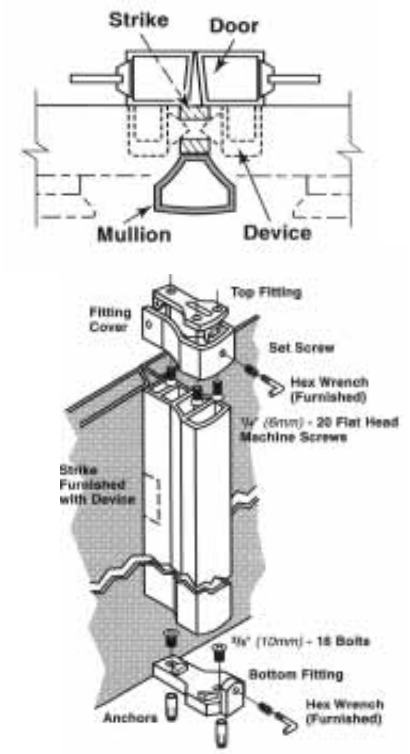
**9854** Prepared for one 268 or 499F strike and one 6111 electric strike. Indicate handing for electric strike. UL fire labelled mullion for up to 3 hour openings up to 8' x 8' (*2438mm x 2438mm)* using Von Duprin Fire Exit Rim Devices




## Aluminum Mullions

**5654** Prepared for two 264 or 299 strikes with weatherstripping. Includes one set of 154 stabilizers.

**5754** Prepared and furnished with one 1408 double door strike. Includes one 154 stabilizer set.
**Note: specify device "less strike".**




## Sizes for Mullions

| 1654, 4954, 4754, 4854, 5654, 5754 | 9854, 9954 |
|---|---|
| 7´ 2´´*(2184mm)* | 7´ 3´´*(2210mm)* |
| *8´ 2´´*(2489mm)* | 8´ 3´´*(2475mm)* |
| *10´ 2´´*(3099mm)* | 10´ 3´´*(3124mm)* |

| KR1654, KR4954, KR4754, KR4854 | KR9854**, KR9954*** |
|---|---|
| 7´ 6´´*(2286mm)* | 7´ 5´´*(2261mm)* |
| 8´ 6´´*(2591mm)* | *8´ 5´´*(2565mm)* |
| 10´ 6´´*(3200mm)* | *10´ 5´´*(3175mm)* |

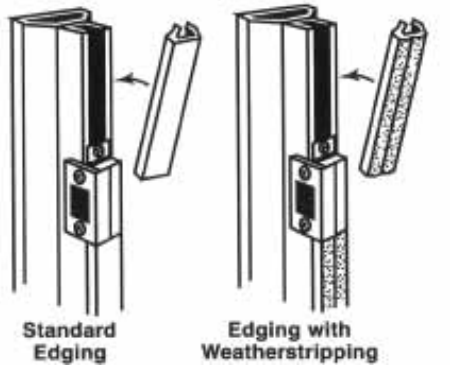
* Only qualifying applications will be provided with UL Label.

** Fire rated same as 9854

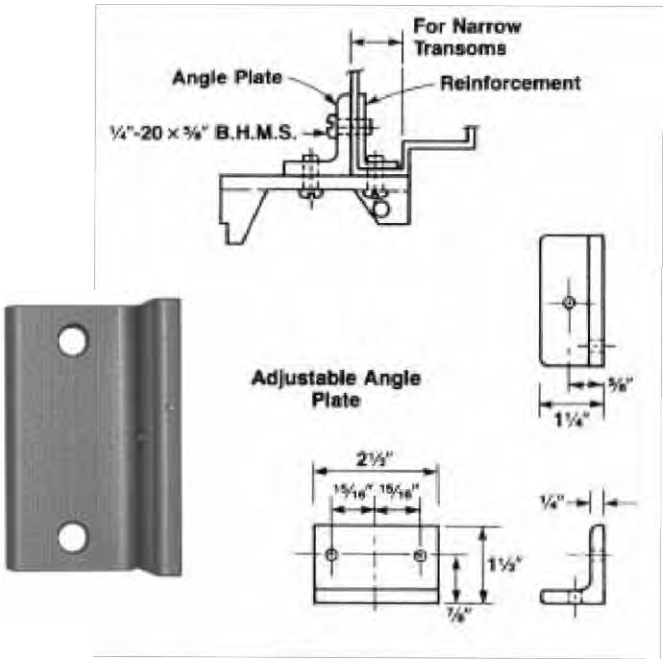
*** Fire rated same as 9954

## Weatherstripping

Weatherstripping retards cold air from blowing between doors and mullion. It also serves as a silencer when the door is closed against the mullion. The silicone treated weatherstrip pile is bonded to a polypropylene backing. A slide-in molding houses the weatherstripping, covers mounting screws of the strike and extends to both the top and bottom of the mullion. Available on Aluminum Mullions only.



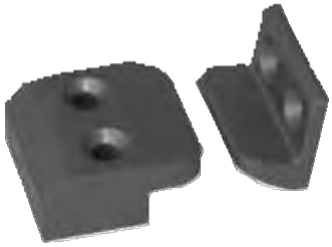

**Angle Plate** is used with narrow transom frames. The plate attaches to the transom extending the surface area needed to mount the mullion. Must be ordered separately. Specify finish.

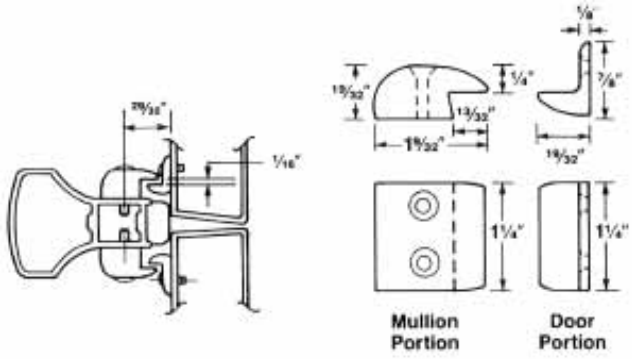



**154 Stabilizer** is a two-piece interlocking set. One piece mounts on the mullion with the top mounting hole 5³/₁₆´´ *(148mm)* below the centerline of the strike; the other piece mounts on the door. Shims are provided to adjust for misalignment between the door and mullion.

The set maintains integrity between the door and mullion to prevent vandalism and to ensure contact between the device and strike as the doors expand and contract with temperature changes.

Furnished standard on aluminum mullions; optional for steel and all blank steel mullions.



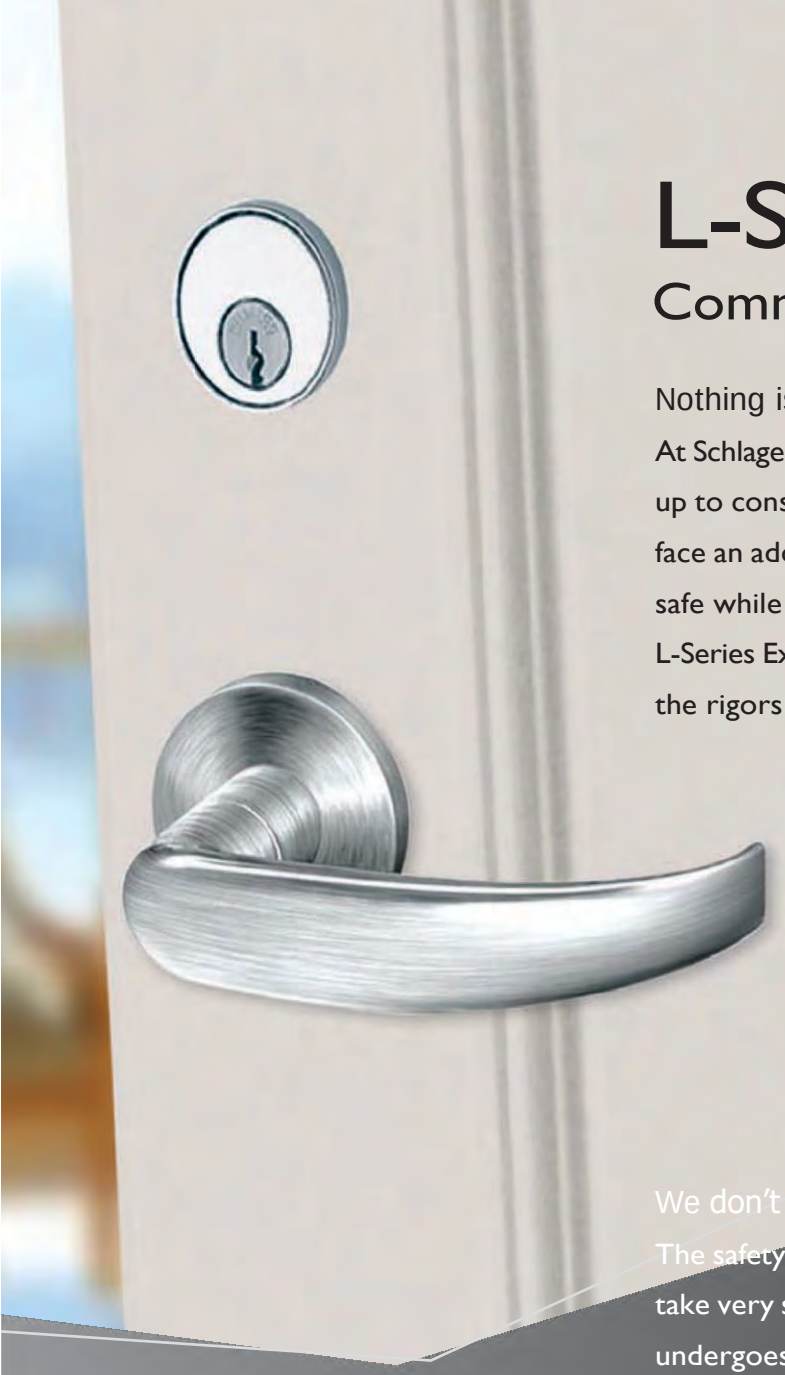



**MT54 Storage Kit** is a set of floor and wall brackets that provide convenient storage of the keyed removable mullion when removed from the opening.

**To Order, specify**

1. Model MT54.
2. Finish SP28, SP313, or SPBLK


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# L-Series

## Commercial Locks

### Nothing is tougher.

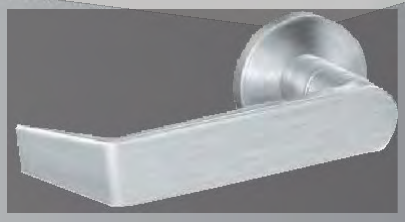
At Schlage we know that every product you specify has to stand up to constant use and abuse. Your building's locking systems face an additional challenge – keeping people and other assets safe while delivering constant, reliable performance. Schlage L-Series Extra Heavy Duty Mortise Locks are built to withstand the rigors of daily use without fail.

### We don't compromise on security.

The safety and security of your clients' buildings is something we take very seriously. That's why every Schlage lock and deadbolt undergoes intensive testing to determine its ANSI grade level:

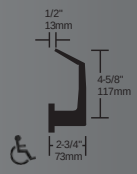
- Cycle tests
- Door impact tests
- Bolt strength tests
- Resistance tests
- Warped door tests

We pay attention to these details so you can focus on creating a functional and aesthetically pleasing environment for your clients. In fact, every one of our L-Series locks meets ANSI Grade 1 standards for safety.



06

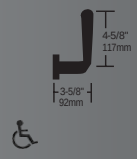
Material: Forged brass, bronze and cast stainless steel Finishes: 605, 606, 609, 610, 611, 612, 613, 616, 619, 625, 626, 629, 630






07

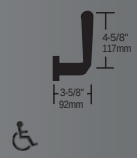
Material: Forged brass, bronze and cast stainless steel Finishes: 605, 606, 609, 610, 611, 612, 613, 616, 619, 625, 626, 629, 630






12

Materials: Forged brass, bronze and cast stainless steel Finishes: 605, 606, 609, 610, 611, 612, 613, 616, 619, 625, 626, 629, 630 Specify door hand




## Finish Key



605
Bright Brass



606
Satin Brass



609
Antique Brass



610
Bright Brass, Blackened



611
Bright Bronze



612
Satin Bronze



613
Oil Rubbed Bronze



616
Antique Bronze



619
Satin Nickel



625
Bright Chromium Plated



626
Satin Chromium Plated



629
Bright Stainless Steel



630
Satin Stainless Steel

# Escutcheons and Roses

Choose from three types of escutcheon and two rose sizes to add tough, durable performance to your lockset.

## Escutcheons



### L Full Face

Material: Cold-forged brass, bronze or stainless steel
Finishes: 605, 606, 612, 613, 619, 625, 626, 629, 630
Size: 8" x 1 ¾" x 7/16"
(203 mm x 44 mm x 11mm)






### L Concealed

Material: Cold-forged brass, bronze or stainless steel
Finishes: 605, 606, 612, 613, 619, 625, 626, 629, 630
Size: 8" x 1 ¾" x 7/16" (203 mm x 44 mm x 11 mm)






### N Escutcheon

Material: Heavy wrought reinforced brass, bronze or stainless steel
Finishes: 605, 606, 612, 613, 619, 625, 626, 629, 630
Size: 8" x 2 9/16" x 7/16"
(203 mm x 65 mm x 11 mm)




## Roses



### A Wrought Rose

2 1/8" (54 mm) diameter
Available for use on L-Series knob and lever designs.
Order by letter designation corresponding to the design and diameter desired.



### B Wrought Rose

2 9/16" (65 mm) diameter
Available for use on L-Series knob and lever designs.
Order by letter designation corresponding to the design and diameter desired.

# Thumbturns

Choose from three variations of thumbturn locks that help you meet the demands of specialized commercial projects.




Hotel Occupancy Indicator
09-611
For lock function L9486P, this unit can be used with A or B roses. Requires a 1 3/8" (35 mm) cylinder for 1 3/4" (44 mm) doors. Specify finish when ordering separately.



Optional EZ Turn
L583-363
Available for rose and escutcheon trim. Disability turn (ADA) option to standard thumbturn. Can be used with thumbturn-function L-Series lock except L9463 and L463. Specify lock per L583-363 when ordering.



Coin Turn
For lock functions L9044 and L9444 with rose trim. Specify 09-509 and finish per L283-124 when ordering.



03 Lever Shown

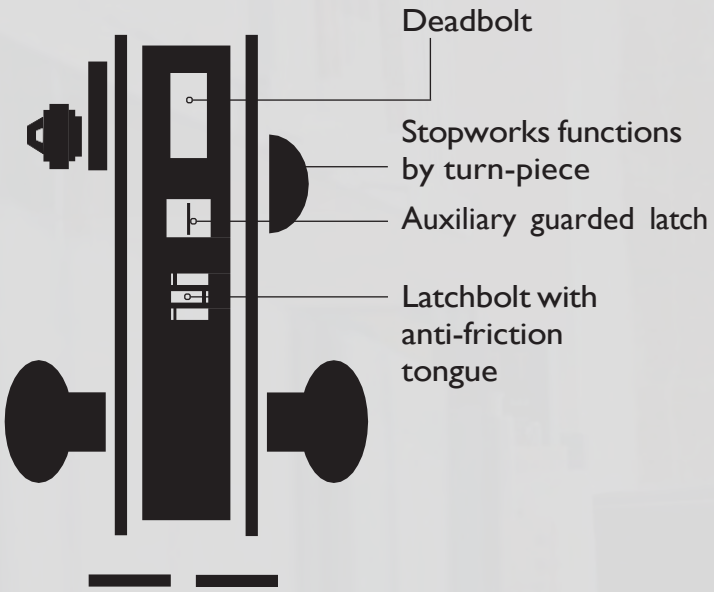
## Tactile Warning (Knurling)

Schlage L-Series commercial levers feature knurling only on the outside lever unless otherwise specified. This feature is available on the following lever models: 01, 02, 03, 05, 06, 07, 12, 17, 18, 41, 42 and 93.

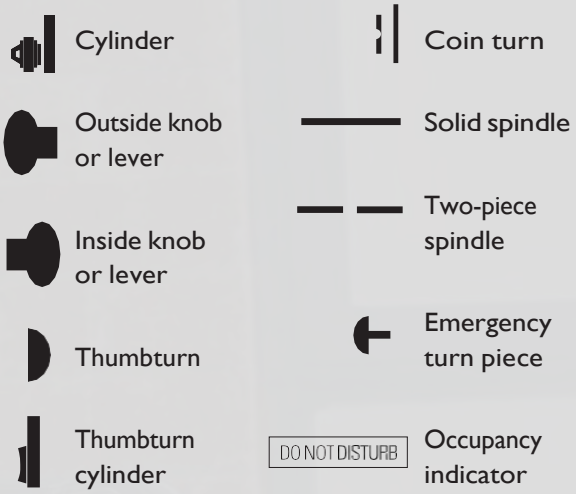
Products featuring a knurled surface will be indicated by adding the prefix "8" to the model number. For example, L905P 803/03A.

# Lock Functions

## Lock Components




## Symbol Key




## Product Identification Guide

L/LV 9 4 5 3 P

Lock series
L = standard
LV = vandlgard

0 = dummy trim without lock case
9 = functions with lock case

0 = no deadbolt
1 = dummy trim
4 = with deadbolt

Function

Cylinder Suffix
P = 6-pin full-face mortise cylinder with Schlage logo*
L = less full-face cylinder
C = concealed mortise cylinder
W = less concealed cylinder
R = full-size interchangeable core with Schlage logo
J = less full-size interchangeable core
F = full-size interchangeable core less Schlage logo
T = full-size construction core
BD = SFIC less core
BDC = disposable SFIC
GD = Everest patented SFIC
HD = construction SFIC

SFIC = Small Format (Best® style) Interchangeable Core

To order less Schlage logo, specify lock "with K510-612 faceplate."

LV = Vandlgard® function allows exterior lever to rotate freely down while remaining securely locked.

# Lock Functions | Single Cylinder Non-Deadbolt Functions

Schlage ANSI



L9050 F04
LV9050
Office and Inner Entry Lock
Latchbolt retracted by knob/lever from either side unless outside is made inoperative by key outside or by turning inside thumbturn. When outside is locked, latchbolt is retracted by key outside or by knob/lever inside. Outside knob/lever remains locked until thumbturn is returned to vertical or unlocked by key. Auxiliary latch deadlocks latchbolt when door is closed. Inside liner is always free for immediate egress.



L9056
LV9056
L9050 with Automatic Unlocking
Latchbolt retracted by knob/lever from either side unless outside is made inoperative by key outside or by rotating inside thumbturn. Outside knob/lever unlocked by key outside, thumbturn or closing door. Rotating inside knob/lever simultaneously retracts latchbolt and unlocks outside knob/lever. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.



L9060 F09
LV9060
Apartment Entrance Lock
Latchbolt retracted by knob/lever from either side unless outside is locked by key from inside. When locked, latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.



L9070 F05
LV9070
Classroom Lock
Latchbolt retracted by knob/lever from either side unless outside is locked by key. Unlocked from outside by key. Inside knob/lever always free for immediate exit. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.



L9071
LV9071
Classroom Security Lock
Latchbolt retracted by knob/lever from either side unless outside is locked by key from either side. When locked, latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is locked. Inside lever is always free for immediate egress.

Schlage ANSI



L9076 F06
LV9076
Classroom Holdback Lock
Latchbolt retracted by knob/lever from either side unless outside is locked by key. When locked, latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Depress inside knob/lever and turn key 360° for holdback feature. Inside lever is always free for immediate egress.



L9077
LV9077
Classroom Security Holdback Lock
Latchbolt retracted by knob/lever from either side unless outside is locked by key from either side. When locked, latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is locked. Depress inside knob/lever and turn key 360° for holdback feature. Inside lever is always free for immediate egress.



L9080 F07
LV9080
Storeroom Lock
Latchbolt retracted by key outside or by knob/lever inside. Outside knob/lever is always inoperative. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.



L9080EL
LV9080EL
Electrically Locked (Fail Safe)
Outside knob/lever continuously locked by 24V AC or DC. Latchbolt retracted by key outside or by knob/lever inside. Switch or power failure allows outside knob/lever to retract latchbolt. Auxiliary latch deadlocks latchbolt when door is closed. Inside knob/lever always free for immediate exit. Inside lever is always free for immediate egress.



L9080EU
LV9080EL
Electrically Unlocked (Fail Secure)
Outside knob/lever unlocked by 24V AC or DC. Latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Inside knob/lever always free for immediate exit. Inside lever is always free for immediate egress.



L9080EL-RX
L9080EU-RX
Request to Exit (RX) Electrified Lock
Same as L9080EL and L9080EU functions. In addition, a micro-switch positioned inside the lock case monitors the retractor crank, and is actuated when rotation of the inside or outside knob/levers rotates the retractor hub. The switch signals the use of that opening to security systems, allowing a non-disruptive means of immediate egress. Specify per L283-059 for normally closed contacts (default). Specify L283-125 for normally open contacts. Inside lever is always free for immediate egress. (Previously XL11-807)

# Lock Functions |
## Double Cylinder Non-Deadbolt Functions

Schlage ANSI



L9485
LV9485
Hotel or Restroom Lock
Latchbolt retracted by key outside or by knob/lever inside. Outside knob/lever always fixed. Deadbolt thrown or retracted by inside thumbturn. When deadbolt is thrown all keys become inoperative except emergency or display keys. Turning inside knob/lever retracts both deadbolt and latchbolt simultaneously. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.




L9486 F15
LV9486
Hotel or Restroom Lock with
**"Do** Not **Disturb"** Indicator
Latchbolt retracted by key outside or by knob/lever inside. Outside knob/lever always fixed. Deadbolt thrown or retracted by inside thumbturn. When deadbolt is thrown "Do Not Disturb" plate is displayed. All keys become inoperative except emergency or display keys. Turning inside knob/lever retracts both deadbolt and latchbolt simultaneously. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.




L9486 x L583-375
LV9486 x L583-375
L9486 with **"Occupied"** Indicator
Latchbolt retracted by key outside or by knob/lever inside. Outside knob/lever always fixed. Deadbolt thrown or retracted by inside thumbturn. When deadbolt is thrown "Occupied" plate is displayed and all keys become inoperative except emergency keys. Turning inside knob/lever simultaneously retracts both deadbolt and latchbolt. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress. (Previously XL11-580)

# Lock Functions |
## Double Cylinder Deadbolt Functions

Schlage ANSI




L9496
Privacy with **"Occupied"** Indicator
Knob/lever retracts latchbolt from either side. Deadbolt thrown or retracted by key outside (retraction by key required in the event of an emergency) or inside thumbturn. Throwing deadbolt locks outside knob/lever and displays "Occupied" plate. Rotating inside knob/lever simultaneously retracts both deadbolt and latchbolt, and unlocks outside knob/lever. Inside lever is always free for immediate egress. (Previously XL11-885)

*In a double-door application where the dummy will be used as the strike order 10-091 Armored Front Strike separately.

Caution: Double cylinder locks on residences and any door in any structure which is used for egress are a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.

# Lock Functions |
## Full Mortise Deadlocks

Schlage ANSI



L9460 F17
Cylinder x Thumbturn Lock
Deadbolt thrown or retracted by key outside or thumbturn inside.



L9462 F16
Double Cylinder Lock*
Deadbolt operated by key from either side.



L9463
Classroom Lock
Deadbolt thrown or retracted by key from outside. Inside thumbturn cylinder retracts deadbolt, but cannot project it.



L9464 F18
Cylinder Lock
Deadbolt thrown or retracted by key from one side. No trim on opposite side.



L9460 x XL11-635
L9460 with Pull
Knob/lever both sides fixed. Deadbolt thrown or retracted by key outside or thumbturn inside.



L9460 x XL11-886
Single Cylinder Deadlock with Pull
Deadbolt thrown or retracted by key outside or thumbturn inside. No latch, but inside knob or lever is spring-loaded. Rotating inside knob/lever also retracts deadbolt. Fixed outside knob/lever.



L9462 x XL11-886
Double Cylinder Deadlock with Pull
Deadbolt thrown or retracted by key from either side. No latch, but inside knob/lever is spring-loaded. Rotating inside knob/lever also retracts deadbolt. Fixed outside knob/lever.



L9464 x XL11-886
Deadlock with Pull
Deadbolt thrown or retracted by key from one side. No latch, but inside knob/lever is spring-loaded. Rotating inside knob/lever also retracts deadbolt. Fixed outside knob/lever.

# Lock Functions |
## Small Mortise Deadlocks

Schlage ANSI



L460 E06071
Cylinder x Thumbturn Lock
Deadbolt thrown or retracted by key outside or thumbturn inside.



L462 E06061
Double Cylinder Lock*
Deadbolt operated by key from either side.



L463 E06091
Classroom Lock
Deadbolt thrown or retracted by key from outside. Inside thumbturn cylinder retracts deadbolt, but cannot project it.



L464 E06081
Cylinder Lock
Deadbolt thrown or retracted by key from one side. No trim on opposite side.



L480
Door Bolt
Deadbolt thrown or retracted by thumbturn from one side. No trim on opposite site.




L496
Deadbolt with **"Occupied"** Indicator
Deadbolt thrown or retracted by key outside or thumbturn inside. When deadbolt is thrown "Occupied" plate is displayed. (Previously XL11-911)



L9110 x XL11-741
Full Dummy Trim with Lock Case*
Spring-loaded knob/lever both sides. Includes lock case and blank armored front. May be ordered with optional XL11-743 armored front with cutout to receive deadbolt



L9040
LV9040
Privacy With Turns Both Sides
Latchbolt retracted by knob/lever from either side unless outside is locked by inside or outside thumbturn. Operating inside knob/lever, closing door or rotating either thumbturn unlocks outside knob/lever.

# Specifications

Handing:
L9000-Series lock bodies are field-reversible without disassembly. L400-Series locks are non-handed.

Door Thickness:
1 3/4" (44 mm) standard. 1 3/8" (35 mm) to 2 1/2" (64 mm) optional. Over 2 1/2" (64 mm) door ranges vary by function. No escutcheon available for 1 3/4" (44 mm) doors standard. 2" to 2 3/8" (51 mm to 60 mm) optional. Specify door thickness if other than 1 3/4".

Backset:
2-3/4" (70 mm) only.

Armored Front:
L9000-Series: 1 1/4" x 8" x 7/32" (32 mm x 203 mm x 6 mm) standard.
1 1/16" x 8" x 1 7/32" (27 mm x 203 mm x 6 mm) optional.
L400-Series: 4 7/16" x 3 5/8" x 1" (113 mm x 92 mm x 25 mm)

Case Size:
L9000-Series: 4 7/16" x 6 1/16" x 1" (113 mm x 154 mm x 25 mm)
L400-Series: 4 7/16" x 3 5/8" x 1" (113 mm x 92 mm x 25 mm)

Spacing:
Knob or lever to cylinder, 3 7/8" (98mm); knob or lever to thumbturn hub, 2 11/16" (68mm).

Bolts:
1" (25mm) throw stainless steel deadbolt and 3/4" (19mm) throw stainless steel latch with anti-friction tongue.

Exposed Trim:
Knobs: #41 and #42 heavy-duty wrought brass, bronze or stainless steel knobs match D-Series knobs.
Levers: Forged brass or bronze and cast stainless steel. Designs available to match D-Series levers.
93 Lever Design: Extruded brass, bronze or stainless steel.

Mediterranean Designs: Forged-brass lever and rose.

Escutcheons: L escutcheons are cold-forged brass or bronze and stainless steel. N escutcheons are heavy wrought reinforced brass, bronze and stainless steel.

Trim Combinations: Available with knob both sides, lever both sides, or knob and lever with rose or escutcheon both sides.

Strike:
L9000-Series: ANSI curved lip strike 1 1/4" x 4 7/8" (32 mm x 124 mm) x 1 3/16" (30 mm) lip to center with dust box standard. L400-Series: 1 1/8" x 3 5/8" (29 mm x 92 mm) with dust box.

Cylinder & Keys:
6-pin Everest C123 keyway cylinder with two patented keys standard.

Keying Options:
Interchangeable core and Primus high security cylinders. Master keying, grand master keying and construction keying.

# Certifications

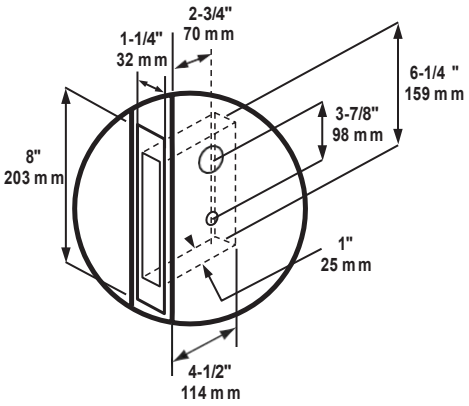
ANSI:
L9000: ANSI A156.13 Series 1000, Grade 1 Operational and Security, UL Listed for 3-hour fire door (except L9076 and L9007). With interchangeable core cylinders: Grade 2 Security.

With Concealed Shell Cylinder: A156.13 Grade 1 Operational and Security. ANSI/ASTM F476-76 Grade 40, UL Listed. L400: ANSI A156.5 Grade 1

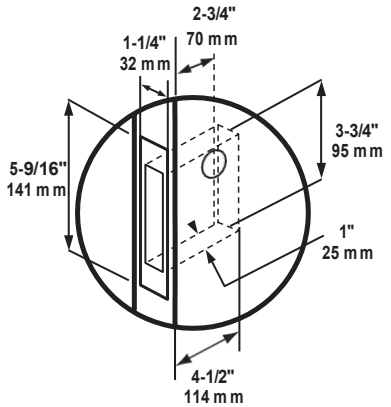
California State Reference Code:
(Formerly Title 19, California State Fire Marshal Standard) All levers with returns comply; levers return to within ½" of door face.

UL / cUL:
All locks listed for A label single doors, 4' by 10'. Letter F and UL symbol on latch front indicate listing. Electrified functions are UL19X Listed for single-point locking applications. UL437 Listed locking cylinder optional: specify Primus 20-500 Series cylinder.

Door Preparation for L9000 Series




Door Preparation for L400 Series



### Strike Application Information

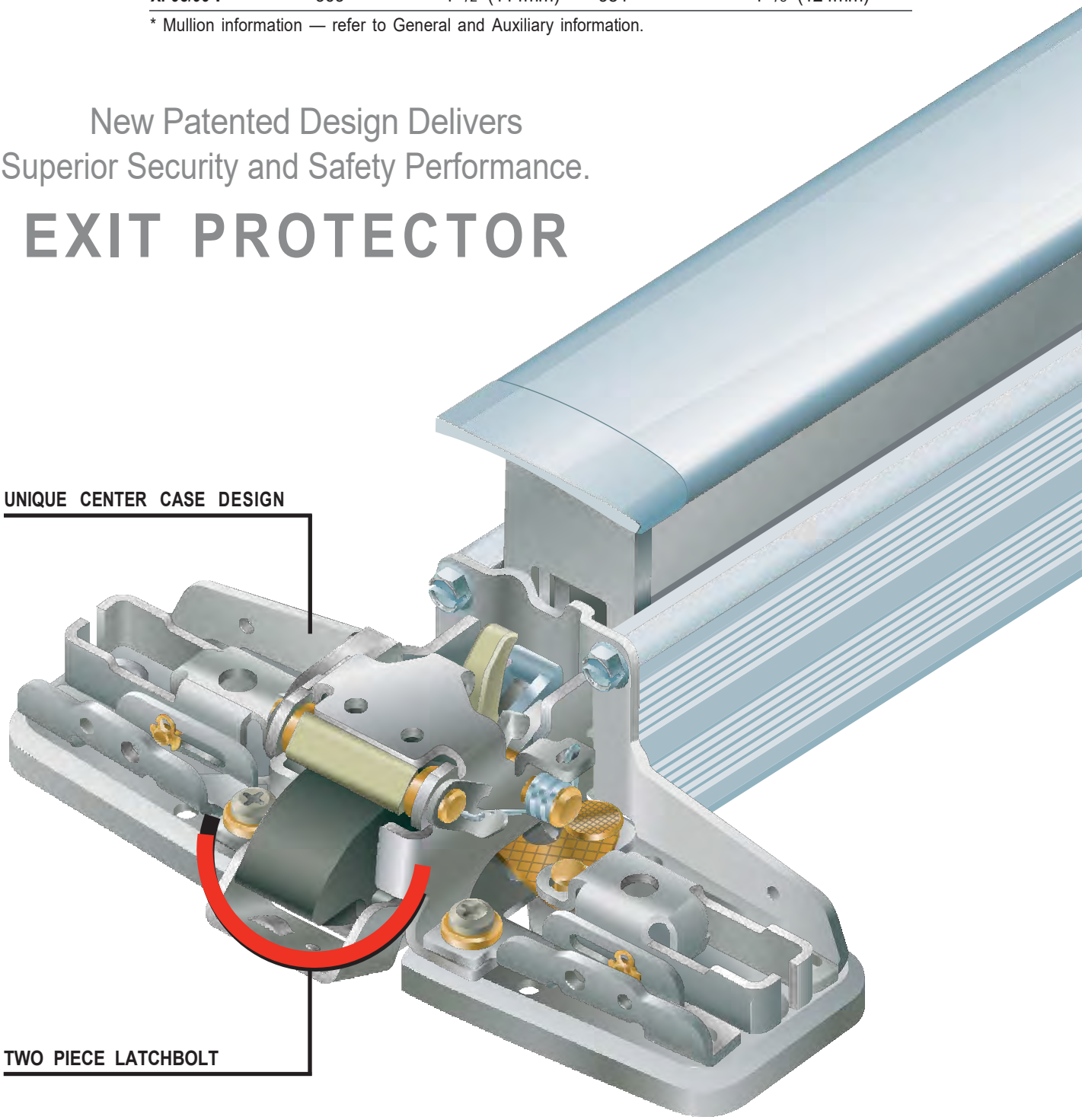
**STRIKE APPLICATION/MINIMUM STILE USING STANDARD TRIM**

| Device Type | Standard Single Door | | Double Door | |
|---|---|---|---|---|
| | Strike | Stile | Strike w/Mullion* | Stile |
| **XP98/99** | 909 | 4 1/2″ (114mm) | 909 | 4 3/4″ (120mm) |
| **XP98/99-F** | 909 | 4 1/2″ (114mm) | 954 | 4 7/8″ (124mm) |

* Mullion information — refer to General and Auxiliary information.

## New Patented Design Delivers Superior Security and Safety Performance.

# EXIT PROTECTOR



VON DUPRIN®

# XP 98/99

*Rim Exit Device*

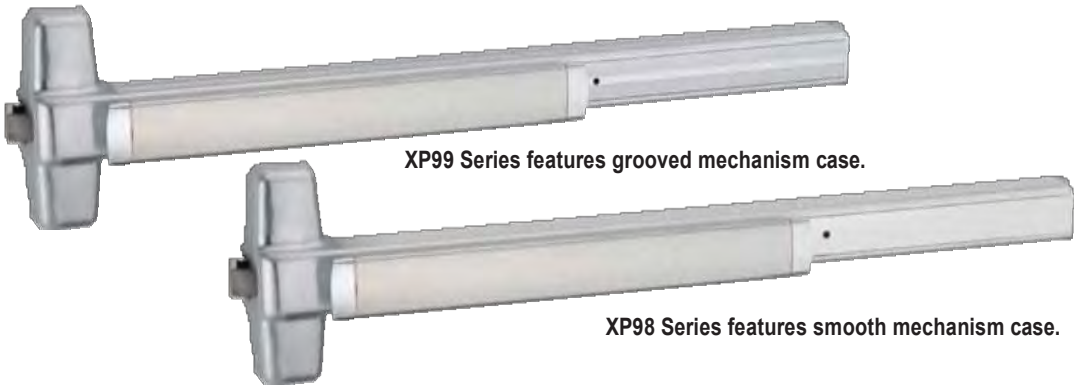


## Introduction

Balancing security and safety has always been a challenge with any panic exit device design. With the new XP98/99 Rim exit device, Von Duprin has engineered a device that reaches a new standard for security while enhancing the safety performance features. The new patented center case design takes the proven reliability of the 98/99 series and adds a new latch bolt concept that delivers the industry's highest lever of latching security.

Additionally, upgrading for current 98/99 owners will be made easy and affordable. The new device will match the existing 98/99 device footprint, eliminating costly door prep changes. A new retrofit kit will allow conversion of existing 99 devices into the new XP99 function, making higher security an affordable function.

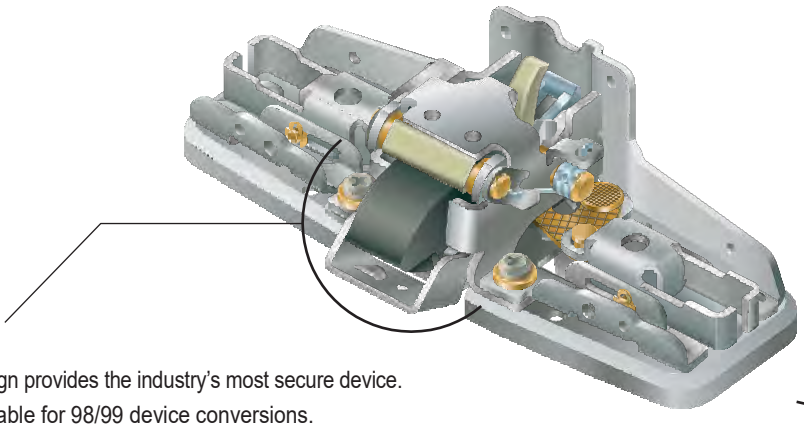
For over 100 years Von Duprin has set the standard for innovation and quality in the world of exit devices. The XP98/99 Rim device is another page in this long honored story of excellence.



**XP99 Series features grooved mechanism case.**

**XP98 Series features smooth mechanism case.**

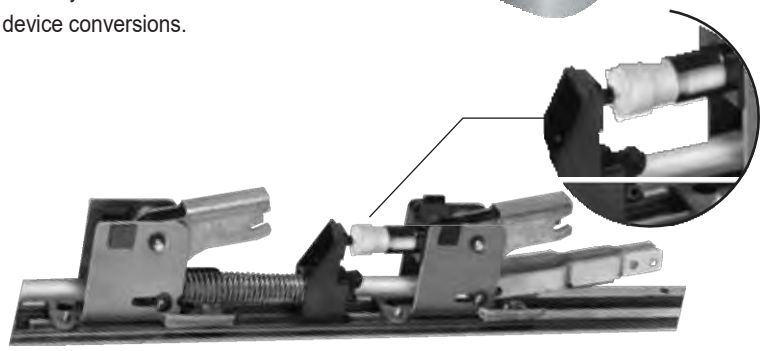
Von Duprin push pad exit devices are available in two external surface styles, designated XP98 Series and XP99 Series. The two styles are mechanically and dimensionally identical and provide a wide selection of appearance options.



## Latch Bolt

New latchbolt design provides the industry's most secure device.

Retro-fit kits available for 98/99 device conversions.



## The Quiet One®

A fluid dampener decelerates the pushpad on its return stroke and eliminates most noise associated with exit device operations. Furnished on all XP98/99™ series exit devices.



**XP98 and XP99 rim exit devices** for all types of single and double doors with mullion, UL listed for accident hazard installations. Covers stock hollow metal doors with 86 or 161 cutouts.

**XP98-F and XP99-F fire exit rim devices** for all types of 4´ x 10´ (1219mm x 2438mm) single doors or 8´ x 10´ (2438mm x 2438mm) double doors with 9954 mullion, UL listed A, B, C, D, or E fire labeled installations.



**909 Strike**



**954 Strike With 9854/9954 Mullion**

## Specifications

| | |
|---|---|
| **Device Functions** | Device ships EO/DT/NL. Field selectable. For TP,K,or L remove NL drive screw from device |
| **Device Lengths** | 3´ 2´4″ to 3´ (711mm to 914 mm) Door Size<br>4´ 2´10″ to 4´ (864 mm to 1219 mm) Door Size |
| **Strikes** | 909 – Panic and Fire Single Door<br>954 — Mullion Fire |
| **Dogging Feature** | Hex key dogging standard |
| **Dogging Options** | CD Cylinder Dogging<br>SD Special Center Case Dogging<br>LD Less Dogging |
| **Electric Options** (Consult factory) | RX Pushpad Monitor Switch*<br>RX2 Double Pushpad Monitor Switch*<br>E Electric Locking & Unlocking<br>ALK Alarm Exit Kit* |
| **Miscellaneous Options** | -2 Double Cylinder*<br>GBK Glass Bead Kit |
| **Fasteners & Sex Bolts (SNB)** | Includes 1 ³/₄″ (19mm) – 2 ¹/₄″ (57mm) Wood & Metal Doors<br>Optional SNB available for device, see next page for quantities |
| **Latch Bolt** | Deadlocking, ³/₄″ (19mm) throw |
| **Device Centerline from Finished Floor** | 39 ¹³/₁₆″ (1011 mm)<br>39 ¹¹/₁₆″ (1008 mm) with Mullion |
| **Center Case Dimensions** | 8″ x 2 ³/₄″ x 2 ³/₈″ (203mm x 70mm x 60mm) |
| **Mechanism Case Dimensions** | 2 ¹/₄″ x 2 ¹/₄″ (57mm x 57mm) |
| **Projection** | Pushbar Neutral – 3 ¹³/₁₆″ (97 mm)<br>Pushbar Depressed – 3 ¹/₁₆″ (78 mm) |

**See full-line product catalog for "How to Order" specification.**

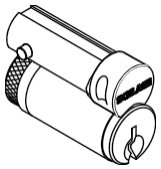
*** Available Q3, 2006**

© 2005 Ingersoll Rand. May be copied for use with specification submittal.

| | **Exit only** | **Dummy Trim**<br>Pull when Dogged<br>  | **Night Latch**<br>Key Retracts Latchbolt<br>  | **Night Latch**<br>Key Retracts Latchbolt<br>Optional Pull Required<br>  |
|---|---|---|---|---|
| Product Description | XP98EO<br>XP99EO | XP98DT<br>XP99DT | XP98NL<br>XP99NL | XP98NL-OP<br>XP99NL-OP |
| Trim Description | — | 990DT | 990NL-R/V | 110NL-MD<br>110NL-WD |
| Escutcheon Plate Size | — | 3" x $14^{3}/_{16}$" x $^{3}/_{32}$"<br>*(76x360x2mm)* | 3" x $14^{3}/_{16}$" x $^{3}/_{32}$"<br>*(76x360x2mm)* | — |
| Pull Center to Center | — | $5^{1}/_{2}$" *(140mm)* | $5^{1}/_{2}$" *(140mm)* | — |
| Projection | — | 2" *(51mm)* | 2" *(51mm)* | — |
| ANSI Function | 01 | 02 | 03 | 03 |
| Cylinder Type | — | — | Rim | Rim |
| Optional Trim<br>(See pages 32 – 34) | x990EO<br>x992EO<br>x994EO<br>x996EO | x991K-DT<br>x992L-DT<br>x994L-DT<br>x996L-DT<br>x696DT<br>x697DT | x991K-NL<br>x992L-NL<br>x994L-NL<br>x996L-NL<br>x696NL<br>x697NL | |
| Optional #425 Sex Bolt Quantity for Device | 6 | 2 | 2 | 6 |

| | **Lever**<br>Key Locks & Unlocks<br>  | **Lever – Night Latch**<br>Key Retracts Latchbolt<br>  | **Lever – Blank Escutcheon**<br>Always operable<br>(No Cylinder)<br>  | **Lever Dummy Trim**<br>Pull when Dogged<br>  |
|---|---|---|---|---|
| Product Description | XP98L<br>XP99L | XP98L-NL<br>XP99L-NL | XP98L-BE<br>XP99L-BE | XP98L-DT<br>XP99L-DT |
| Trim Description | 996L-R/V | 996L-NL-R/V | 996L-BE-R/V | 996L-DT-R/V |
| Escutcheon Plate Size | $2^{3}/_{4}$" x $10^{3}/_{4}$" x $^{27}/_{32}$"<br>*(70x273x21mm)* | $2^{3}/_{4}$" x $10^{3}/_{4}$" x $^{27}/_{32}$"<br>*(70x273x21mm)* | $2^{3}/_{4}$" x $10^{3}/_{4}$" x $^{27}/_{32}$"<br>*(70x273x21mm)* | $2^{3}/_{4}$" x $10^{3}/_{4}$" x $^{27}/_{32}$"<br>*(70x273x21mm)* |
| Pull Center to Center | — | — | — | — |
| Projection | $2^{7}/_{8}$" *(73mm)* | $2^{7}/_{8}$" *(73mm)* | $2^{7}/_{8}$" *(73mm)* | $2^{7}/_{8}$" *(73mm)* |
| ANSI Function | 08 | 09 | — | 02 |
| Cylinder Type | Rim | Rim | — | — |
| Optional Trim<br>(See pages 32 – 34) | x992L<br>x994L | x992L-NL<br>x994L-NL | x992L-BE<br>x994L-BE | x992L-DT<br>x994L-DT |
| Optional #425 Sex Bolt Quantity for Device | 2 | 2 | 2 | 2 |

# Full Size Interchangeable Core Cylinders for Schlage Locksets



### Full Size Core Only

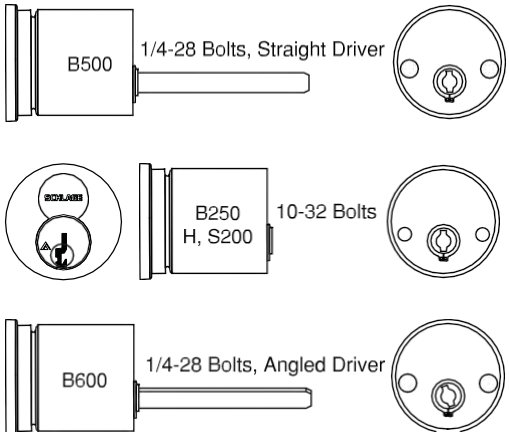
| Number | Mechanism |
|---|---|
| 23-030 | Conventional core |
| 30-120 | Conventional core for hotel function (specify hand) |
| 20-740-XP | Primus XP core (not available in hotel function) |

Available 606 and 626 Þnish only. Order control keys separately.

### Full Size IC Housings for Bored Deadlocks, Less Core

| Lockset Series | Description | Number | Specify Finish |
|---|---|---|---|
| B500-Series | Outside | B610-203, B610-205 | 605, 609, 612, 613, 619, 625, 626, and 716 |
| | Inside | B610-028** | 605, 609, 612, 613, 619, 625, 626, and 716 |
| B250, H, S200-Series | Outside | 22-061 | 605, 606, 609, 610, 611, 612, 613, 616, 625, 626 |
| | Inside of B252 | 22-062 | |
| B600 / 700-Series | Outside | B610-027 | 605, 606, 609, 612, 613, 625, 626 |
| | Inside | B610-028 | See Note Below |

Specify Þnish of B610-031 inside snap-on faceplate ordered separately for BC162 and B662/762.
**Inside housing does not include snap-on faceplate

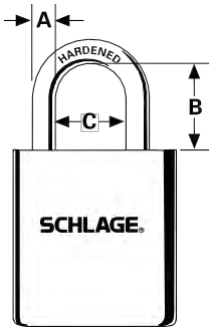





**KS43F** **KS72F** **KS92M**

### Full Size Interchangeable Core Padlocks

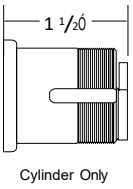
| Part # | Shackle Dimensions | | |
|---|---|---|---|
| | A | B | C |
| **LESS CYLINDER - FULL SIZE INTERCHANGEABLE CORE** | | | |
| **BRASS BODY** | | | |
| KS43A3200 | 3/8Ó | 3/4Ó | 3/4Ó |
| KS43D3200 | 3/8Ó | 1 1/2Ó | 3/4Ó |
| KS43F3200 | 3/8Ó | 2Ó | 3/4Ó |
| KS43G3200 | 3/8Ó | 4Ó | 3/4Ó |
| **STEEL BODY** | | | |
| KS72M3200 | 7/16Ó | 1Ó | 7/8Ó |
| KS72F3200 | 7/16Ó | 2Ó | 7/8Ó |
| KS92M3200 | 3/8Ó | 1Ó | 3/4Ó |



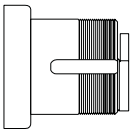

**Note: To order Primus XP add the sufÞx - XP to the Primus part number. (Example: 12-345-XP)**

# Full Size Interchangeable Core Mortise Cylinders

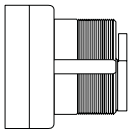





Cylinder Only



Compr. Ring & Spring



With Blocking Ring



### Cylinders for Schlage L-Series Mortise Locks

| | Design | Function | Core Mechanism | | |
|---|---|---|---|---|---|
| | | | Conventional | Primus, Primus XP | Housing Less Core |
|  | **L & N Escutcheons** (cylinders with compression ring) | All Except Below | 30-008 | 20-798, 20-798-XP | 30-007 |
| | | L9060P Outside | 30-030 | 20-782, 20-782-XP | 30-032 + 36-083 |
| | | L9485P, L9486P Hotel Funtions | 30-010* | N/A | 30-007 |
|  | **Sectional Trim** (cylinder with compression ring, spring and 3/8" blocking ring). 9060 requires 1/2" blocking ring. | All Except Below | 30-138 | 20-776, 20-776-XP | 30-137 |
| | | L9060P Outside | 30-030 + 36-083 + 35-082-030 | 20-783, 20-783-XP | 30-032 + 36-083 + 36-082-050 |
| | | L9485P, L9486P Hotel Funtions | 30-040* | N/A | 30-137 |



**L583-489**
Cam for All Functions Except L9060 Outside



**K510-680**
Cam for L9060 Outside

* Hotel function cores are handed. Specify hand of door.

### Mortise Cylinders with Straight Cam for Exit Devices

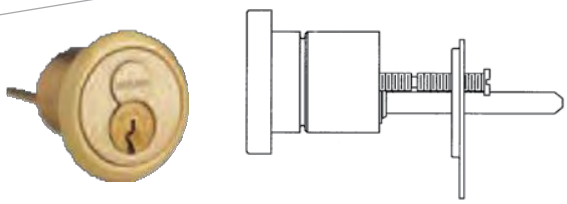
| Number | Core Mechanism | Collar |
|---|---|---|
| 26-091 | Conventional core | Compression ring & spring |
| 20-061 | | 3/8" blocking rings + compression ring & spring |
| 20-763, 20-763-XP | Primus/Primus XP core | Compression ring & spring |
| 20-771, 20-771-XP | | 3/8" blocking rings + compression ring & spring |
| 20-059 | Housing less core | None |
| 26-064 | | Compression ring & spring |



**K510-730**
Straight Cam, Other Applications

Notes 1. Available 605, 606, 609, 610, 612, 613, 625, and 626 finish. Cores furnished 606 and 626 only.
2. To differentiate between Classic and Everest, specify keyway. Example: C or CP (Classic), C123 (Everest). Everest C123 keyway standard.
3. All cylinders are 1 1/2" long.
4. Specify LKB if 0-bitted Primus XP cylinders are required less key blanks.

# Full Size Interchangeable Core Cylinders for Exit Devices, Aluminum Doors, etc.



### Interchangeable Core Rim Cylinders for Exit Devices

| Number | Core Mechanism |
|---|---|
| 20-057 | Conventional core |
| 20-757 | Primus core |
| 20-757-XP | Primus XP core |
| 20-079 | Housing only, less core |

Available 605, 606, 609, 610, 612, 613, 625 and 626 finish.



### Cylinders for Adams Rite MS and 4700 Series Lori 4500 Series and Corbin Russwin DL3000 Series

| Number | Core Mechanism | Collar |
|---|---|---|
| 26-098 | Conventional core | Compression ring & spring |
| 20-062 | Conventional core | 3/16" + 3/8" blocking rings |
| 20-766 | Primus core | 3/16" + 3/8" blocking rings |
| 20-766-XP | Primus XP core | 3/16" + 3/8" blocking rings |
| 20-060 | Housing less core | None |

These cylinders include set screw pack B220-050 for Adams Rite locks.



**K510-711**
Adams Rite
MS Cam

### Cylinders for Adams Rite 4070 Series Deadlocks

| Number | Core Mechanism | Collar |
|---|---|---|
| 20-091 | Conventional core | 3/16" + 3/8" blocking rings |
| 20-722 | Primus core | 3/16" + 3/8" blocking rings |
| 20-722-XP | Primus XP core | 3/16" + 3/8" blocking rings |
| 20-090 | Housing less core | None |



**B520-378**
Adams Rite
4070 Cam

Notes 1. Mortise cylinders available 605, 606, 609, 610, 612, 613, 625, and 626 finish. Cores furnished 606 and 626 only.
2. To differentiate between Classic and Everest, specify keyway. Example: C or CP (Classic), C123 (Everest).
3. All cylinders are 1 1/2" long.
4. Specify LKB if 0-bitted Primus XP cylinders are required less key blanks.

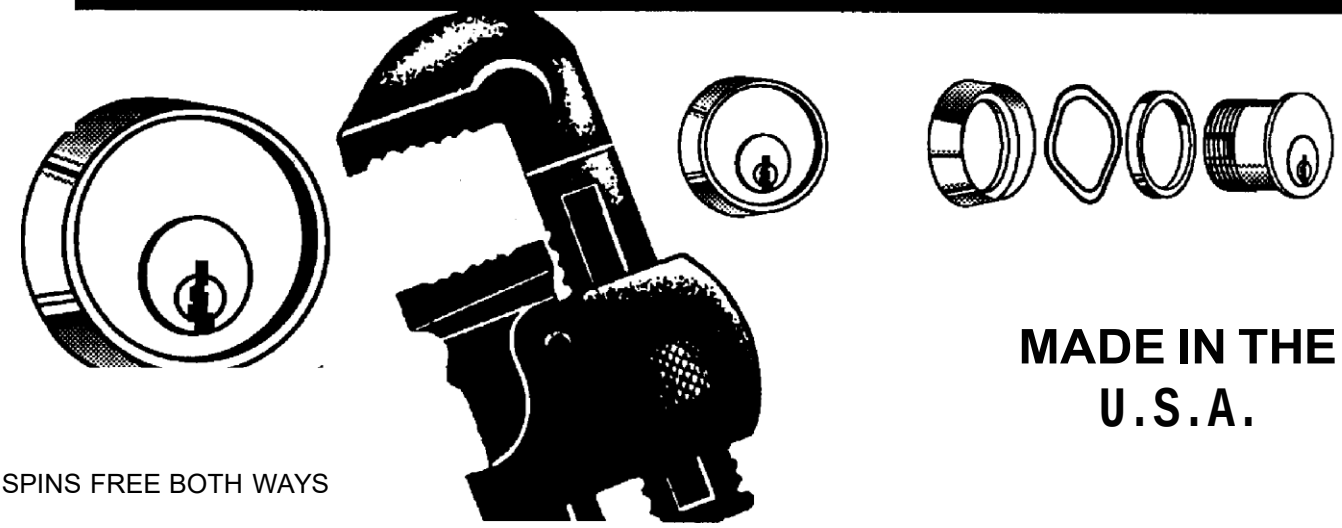
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**HARDENED STEEL-FREE SPINNING-TAPERED CONE-SHAPED CYLINDER GUARD RING**



SPINS FREE BOTH WAYS

**MADE IN THE U.S.A.**

**THIS IS THE CYLINDER GUARD THAT GIVES YOU MORE:**

***LARGE ENOUGH TO EVEN ACCOMODATE 1 1/8" CYLINDERS.***
***PACKAGED SIX TO A PACK FOR SAVINGS AND CONVENIENCE.***
***EACH SIX PACK CONTAINS: 6 HARDENED STEEL RINGS, 6 STAINLESS STEEL WAVE WASHERS & 6 SPACING COLLARS.***

**DURABLE POWDER COAT FINISHES:**

**K-24A ALUMINUM**
**K-24B DURANODIC**

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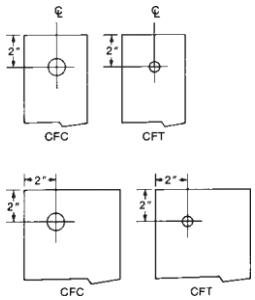
AVAILABLE FROM:



KEEDEX MFG.• 12931 SHACKELFORD LANE• GARDEN GROVE, CA 92641-5108 • (714) 636-5657 FAX: (714) 636-5680

## 8200 Series Push Plates and 8300 Series Pull Plates

- Made from the finest architectural aluminum, brass, and stainless steel.
- For Push Plate sizes other than listed, contact our Customer Service Department or your local sales representative.
- All aluminum, brass, and stainless steel Push Plates meet ANSI A156.6 requirements for .050" thickness.
- Each Push Plate is packaged individually wrapped with mounting screws.
- For special mounting methods other than standard, see pages C11 - C13.




### Push and Pull Plates Cut for Cylinder or Thumbturns

- All plates may be ordered with cutout for cylinder or thumbturn. Standard cutouts are positioned 2" from top of plate and centered on plates up to 4" wide or 2" from edge on plates over 4" wide. Specify hand of door when ordering cutout for plates wider than 4". On pull plates, if the pulls center-to-center dimension interferes with the cutout for the cylinder or thumbturn, please provide drawing of cutout location when ordering.
- Standard size for cylinder cutouts is 1-1/4" diameter and for thumbturn cutout is 3/8" diameter.
- When ordering, add suffix CFC for cut for cylinder, and CFT for cut for thumbturn to product number.



**8200** Push Plate
**8300** Pull Plate (less pull)

**Available Sizes**

| |
|---|
| 3" x 12" |
| 3.5" x 15" |
| 4" x 16" |
| 6" x 16" |
| 8" x 16" |

## How to Order

**8___-___-___-___-___**

**Model:**
- **200** Push Plate,
- **300** Pull Plate, less pull

**Hole Spacing: (for Pull Plate only)**
- **5** for 5-1/4"
- **6** for 6"
- **8** for 8"
- **0** for 10"

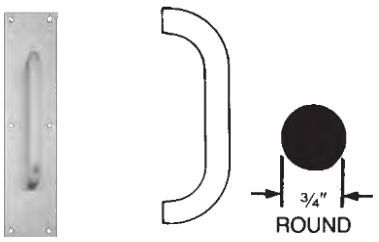
**Finishes:**
US3, US4, US5, US10, US10B, US15, US15A, US26, US26D, US28, US32, US32D

**Size:**
3 x 12, 3-1/2 x 15, 4 x 16, 6 x 16, 8 x 16

**Special Options: (specify handing for plates over 4" wide)**
- **CFC** Cylinder cutout
- **CTC** Thumbturn cutout

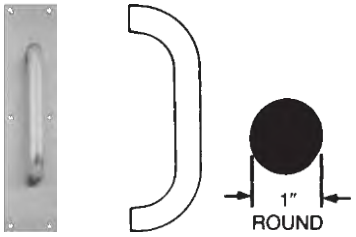
## 8300 Series Pull Plates

- Made from the finest architectural aluminum, brass and stainless steel.
- For Pull Plate sizes other than listed, contact our Customer Service Department or your local sales representative.
- All aluminum, brass, and stainless steel Pull Plates meet ANSI A156.6 requirements for .050" thickness.
- Each Pull Plate is packaged individually wrapped with mounting screws.
- Pulls are centered on plates up to 4" wide and offset 2" from edge of plates wider than 4".
- For special mounting methods other than standard, see pages C11 - C13.



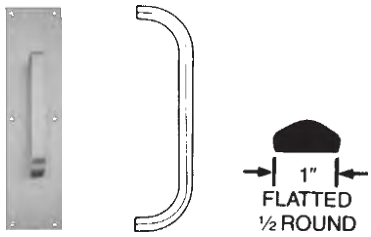

**8302** Pull Plate

- 8300 Plate
  - 3-1/2" x 15"
  - 4" x 16"
  - 6" x 16"
- 8102 Pull
  - 6" centers
  - 8" centers
  - 10" centers




**8303 and 8303EZ** Pull Plate

- 8300 Plate
  - 3-1/2" x 15"
  - 4" x 16"
  - 6" x 16"
- 8103 Pull
  - 8" centers
  - 10" centers




**8305** Pull Plate

- 8300 Plate
  - 3-1/2" x 15"
  - 4" x 16"
  - 6" x 16"
- 8105 Pull
  - 6" centers
  - 8" centers
  - 10" centers

## How to Order

**83___ - ___ - ____ - ____ - ___ - ___**

**Pull Style:**
- **02** for 8102
- **03** for 8103
- **05** for 8105

**Pull Center to Center:**
- **6** for 6" (not available on 8303)
- **8** for 8"
- **0** for 10"

**Finishes:**
US3, US4, US5, US10, US10B, US15, US15A, US26, US26D, US28, US32D

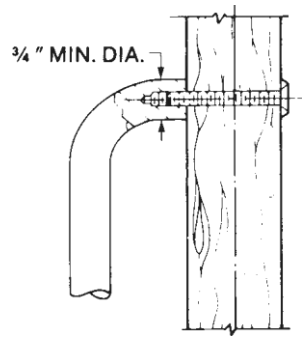
**Size:**
3-1/2" x 15", 4" x 16", 6" x 16"

**Special Options: (Handing needed for 6" x 16", LH or RH)**
- **CFC** Cylinder cutout
- **CTC** Thumbturn cutout

**Mounting:**
- **Blank** Standard
- **F** Concealed pull wood doors w/push plate (special. Not available 8303EZ.)
- **G** Concealed pull plate (Only available 8302, 8303 and 8303EZ)
- **I** Concealed pull wood door (not available 8305 and 8303EZ)
- **J** Back to back pull (not available 8305 and 8303EZ)

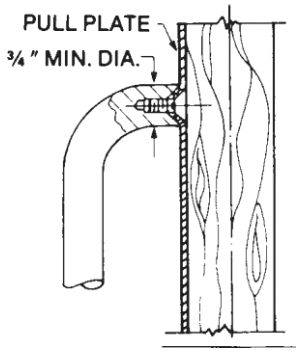
## Mounting

- All mounting hardware is for standard 1-3/4" door.
- Consult Customer Service if other than standard.




Standard Mounting

- (2) 1/4-20 x 2-1/4" brass, oval head machine screws; plated to match.
- (2) No. 14 countersunk washers; plated to match

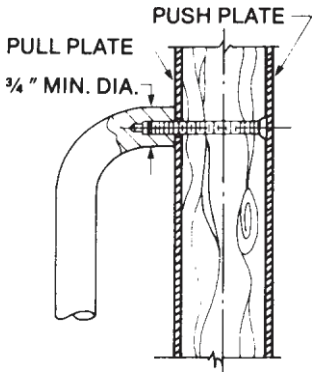



**Type G**
Concealed Pull Plate Mounting

Available only for 8302, 8303, 8311 and 8314 Pull Plates.

- (2) 1/4-20 x 5/8" steel flat head machine screws; zinc plated.

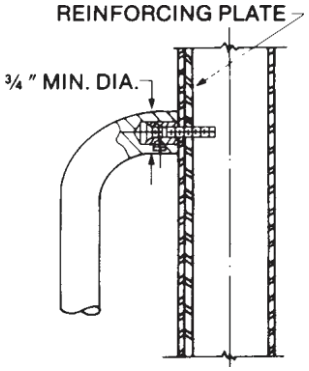
Pull mounts directly onto plate. Plate is attached to door by 6 screws.




**Type F-Special**
Wood Doors
Concealed Pull Mounting With Push Plate

- (2) 1/4-20 x 2-1/4" steel flat head machine screws; zinc plated.

Available only for 8102, 8103, 8105, 8111, 8113, 8114, 8302, 8303, 8305, 8311, 8313 and 8314. Plate on opposite side of door must be ordered separately.




**Type H-Special**
Reinforced Hollow Metal Door
Concealed Pull Mounting

Available only for 8102 and 8103 Pulls.

- (2) Steel screw sleeves; zinc plated.
- (2) 1/4-20 x 1-1/4" steel countersunk trim head machine screw; zinc plated.

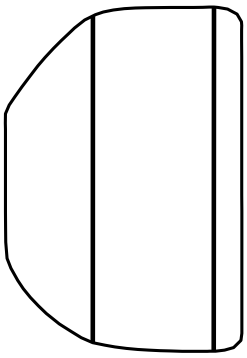
# Vandal Resistant Trim

## VR900 Series

**Features:**

- Stainless Steel construction, 11 gage (0.120" thick).
- Thru-bolts and rugged mounting screws for maximum fastening strength.
- 1/4-20 screws and stainless steel finishing washers supplied with VR900 models; 10-24 screws supplied with VR910 models.
- Built-in lock protector prevents vandalism to mortise latchbolt (available on certain models).
- Extra-tough stainless steel cylinder collar prevents pipe wrench or similar tool from damaging cylinder. Tapered design prevents side impacts from transferring directly to cylinder. Collar spins freely.
- Sleek, attractive design.
- Furnished with mounting screws for door thicknesses of 1-3/4" to 2-1/4".
- Finish: US32D.
- Grip coated in black plastisol for softer touch and resilience to temperature extremes. Grip designed for comfortable operation.
- Meets ANSI/BHMA 156.13, Trim Security Test and California State Accessibility Standards Title 24.

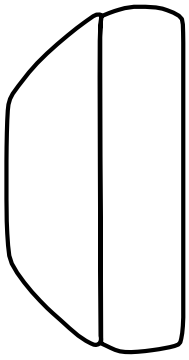




**VR900-RHR**
**VR900-LHR**

- For use with most mortise locks on outswinging doors, including Schlage L9000 Series locks with interior L escutcheon, N escutcheon, and rose trims.
- Includes built-in lock protector and cylinder cutout.
- Handed design allows trim to be positioned to coordinate with the centerline of inside hardware.

| Prod. No. | Width | Height | Thru-Bolt Pattern | Clearance Grip to Door | Proj. |
|---|---|---|---|---|---|
| VR900 | 7-1/4" | 11" | 2" W X 10" H | 1-1/2" | 1-7/8" |

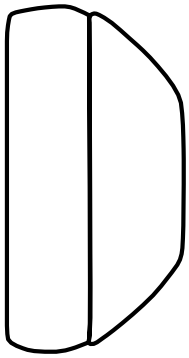


**VR900LLP-RH**
**VR900LLP-LH**

- For use with most mortise locks on inswinging doors, including Schlage L9000 Series locks with interior L escutcheon, N escutcheon, and rose trims.
- Includes cutout for cylinder, less lock protector (LLP).
- Handed design allows trim to be positioned to coordinate with the centerline of inside hardware.

| Prod. No. | Width | Height | Thru-Bolt Pattern | Clearance Grip to Door | Proj. |
|---|---|---|---|---|---|
| VR900LLP | 5-1/4" | 11" | 1-3/4" W X 10" H | 1-1/2" | 1-7/8" |

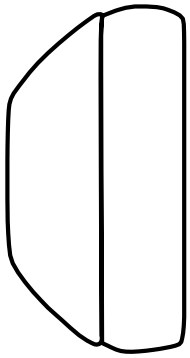
# Vandal Resistant Trim



## VR910-DT

- For use with Von Duprin 98/99 Series Rim and Vertical exit devices.
- Thru-bolts directly to device.
- Pull operation only. No cylinder cutout.

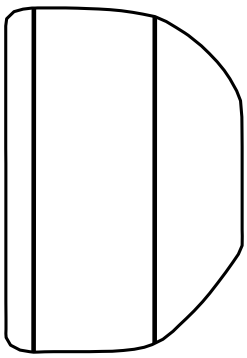
| Prod. No. | Width | Height | Thru-Bolt Pattern | Clearance Grip to Door | Proj. |
|---|---|---|---|---|---|
| VR910DT | 5-1/4" | 11" | 1-3/8" W X 7" H | 1-1/2" | 1-7/8" |



## VR910-NL

- For use with Von Duprin 98/99 Series Rim and Vertical exit devices.
- Thru-bolts directly to device.
- Includes cylinder cutout.
- Tailpiece guide and cylinder cup provided.

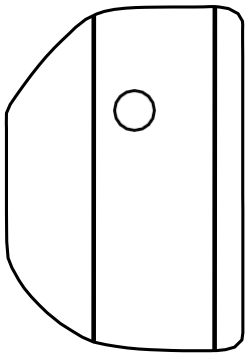
| Prod. No. | Width | Height | Thru-Bolt Pattern | Clearance Grip to Door | Proj. |
|---|---|---|---|---|---|
| VR910NL | 5-1/4" | 11" | 1-3/8" W X 7" H | 1-1/2" | 1-7/8" |



## VR910M-DT

- For use with Von Duprin 98/9975 Series Mortise exit devices.
- Thru-bolts directly to device.
- Includes built-in lock protector.
- Pull operation only. No cylinder cutout.

| Prod. No. | Width | Height | Thru-Bolt Pattern | Clearance Grip to Door | Proj. |
|---|---|---|---|---|---|
| VR910M-DT | 7-1/4" | 11" | 1-3/8" W X 7" H | 1-1/2" | 1-7/8" |



## VR910M-NL RHR
## VR910M-NL LHR

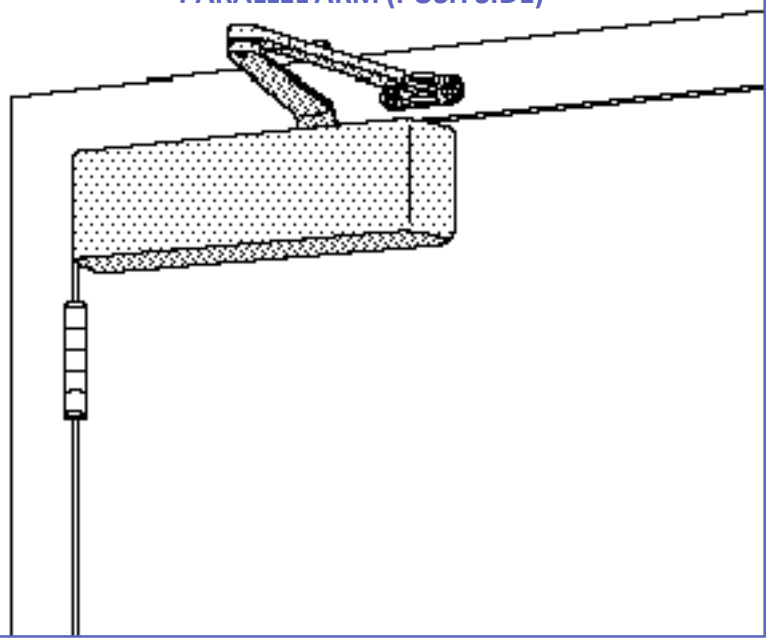
- For use with Von Duprin 98/9975 Series Mortise exit devices.
- Thru-bolts directly to device.
- Includes built-in lock protector and cylinder cutout.

| Prod. No. | Width | Height | Thru-Bolt Pattern | Clearance Grip to Door | Proj. |
|---|---|---|---|---|---|
| VR910M-NL | 7-1/4" | 11" | 1-3/8" W X 7" H | 1-1/2" | 1-7/8" |

FEATURES

**CLOSER MOUNTS**

**HINGE (PULL SIDE) (Shown)**
**TOP JAMB (PUSH SIDE)**
**PARALLEL ARM (PUSH SIDE)**



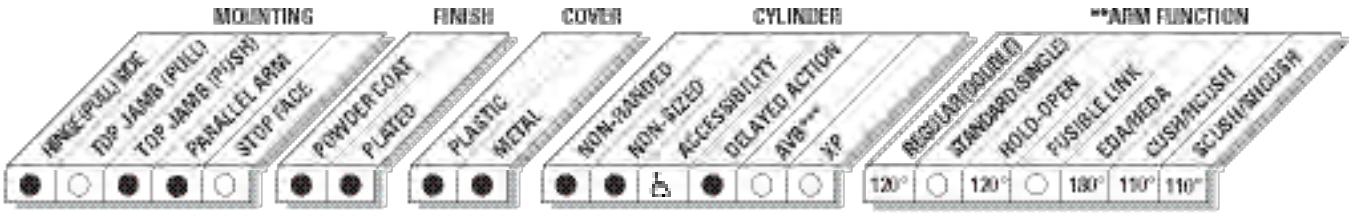
***The 4040 SUPER SMOOTHEE® is LCN's most flexible heavy duty closer designed for institutional and other rugged high traffic applications.***

- **Ten Million Cycles**
- **Cast Iron**
- **Forged Steel Arm**
- **Double Heat Treated Steel Pinion**
- **All Weather Fluid**
- **Non-Handed**
- **LCN® Fast™ Power Adjust**
- **Fast & Accurate Installation**
- **UL & cUL Listed**
- **For XP See Page 40**

- Standard 4040 series closer shipped with regular arm, standard plastic clip-on cover, and self reaming and tapping screws. See 4040 Series pages 45-47 for options.
- Non-sized cylinder is adjustable for interior doors to 5'0" and exterior doors to 4'0".
- Closer mounts hinge side, top jamb, and parallel arm w/PA Shoe on either right or left swinging doors.
- Closers to meet ADA requirements. See 4040 Series page 48.
- Standard or optional custom powder coat finish.
- Optional plated finish on cover, arm, and fasteners.
- Optional SRI primer for installations in corrosive conditions.
- UL and cUL listed for self-closing doors without hold-open.
- Tested and certified under ANSI Standard A156.4, grade one.



*The 4040 Series includes the* **LCN® FAST™ Power Adjust,** *a revolutionary visual indicator for Spring Power Adjustment.*




● *Available*
○ *Not available*

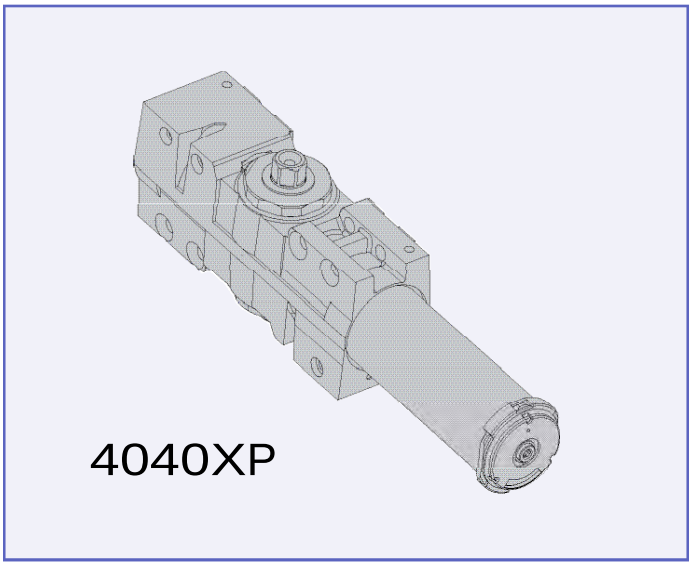
*Closer available with less than 5.0 lbs. opening force on 36" door.*
***Maximum opening/hold-open point with standard template.*
**** Advanced Variable Backcheck*



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FEATURES




## 4040XP

The 4040XP is LCN's most durable heavy duty closer designed for the most demanding, high use and abuse applications.

- 44% increased bearing load capacity
- Strongest pinion ever- at 3/4" journal diameter
- Widest bearing ever- at 5/8"
- Stronger pinion teeth
- New V-shield™ seal with longer life
- XP = eXtra Protection in real world applications
- Cast Iron
- Forged Steel Arm
- Double Heat Treated Steel Pinion
- All Weather Fluid
- Non-Handed
- LCN® Fast™ Power Adjust
- Fast & Accurate Installation
- UL & cUL Listed
- Tested and certified under ANSI Standard A156.4, grade one

- Non-sized cylinder is adjustable for interior doors to 5'0" and exterior doors to 4'0".
- Closer mounts parallel arm (EDA arm) on either right or left swinging doors.
- Optional hinge side and top jamb mount with optional regular arm.
- Closers to meet ADA requirements. See 4040XP Series page 49.
- Standard or optional custom powder coat finish.
- Optional plated finish on metal cover, arm and fasteners.
- Optional SRI primer for installations in corrosive conditions is available with powder coat only.
- UL and cUL listed for self-closing doors without hold-open.
- 4040XP can be used with all 4041 accessories. See pages 45-47 for options.




*The 4040 Series includes the* **LCN® FAST™ Power Adjust,** *a revolutionary visual indicator for Spring Power Adjustment.*




● *Available*
○ *Not available*

♿ *Closer available with less than 5.0 lbs. opening force on 36" door.*
***Maximum opening/hold-open point with standard template.*
**** Advanced Variable Backcheck*



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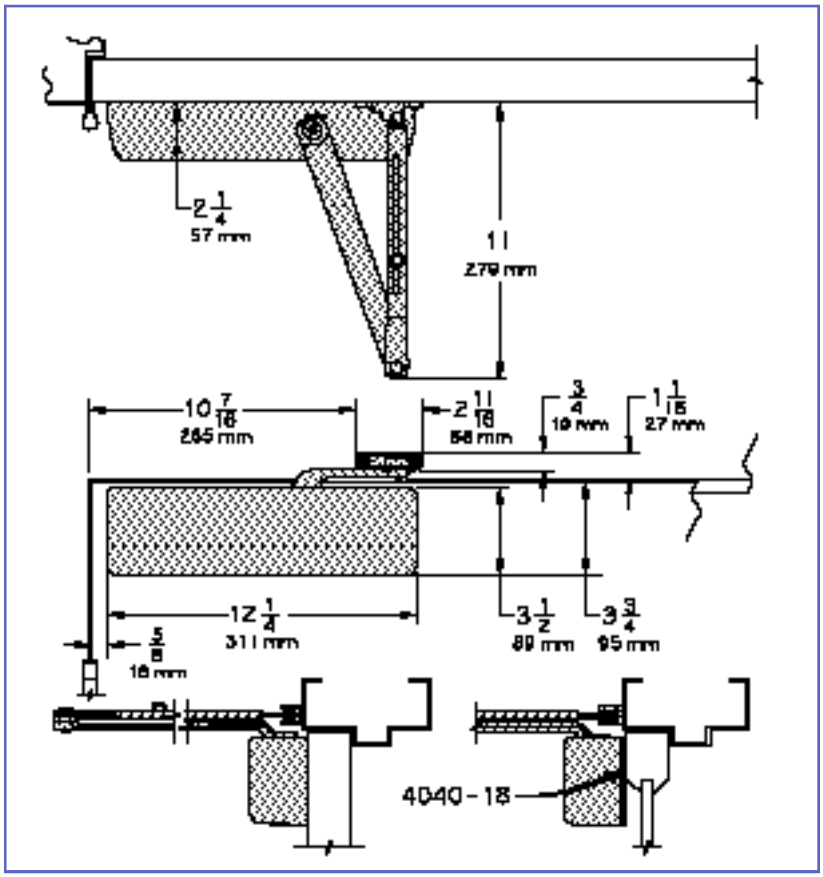
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## HINGE (PULL) SIDE MOUNTING

## MAXIMUM OPENING

Templating allows up to 120°.

Hold-open points 90° up to 120° with hold-open arm.




- **Butt Hinges** should not exceed 5" (127 mm) in width.
- **Auxiliary Stop** is recommended at hold-open point or where a door cannot swing beyond 120°.
- **Reveal** should not exceed 3/4" (19 mm) for regular arm or hold-open arm.
- **Top Rail** less than 3 3/4" (95 mm) requires PLATE, 4040-18. Plate requires 2" (51 mm) minimum.
- **Clearance** of 2 3/8" (60 mm) behind door required for 90° installation.
- **Delayed Action** (not available on 4040XP) Add suffix "DEL" to selected cylinder (eg. 4041 DEL). Delays closing from 120° to 70°. Delay time adjustable up to approximately 1 minute.

**Options**

- 4040XP cylinder
- 4041 Delayed action cylinder.
- Hold-open arm.
- Metal cover.

**Special Templates**

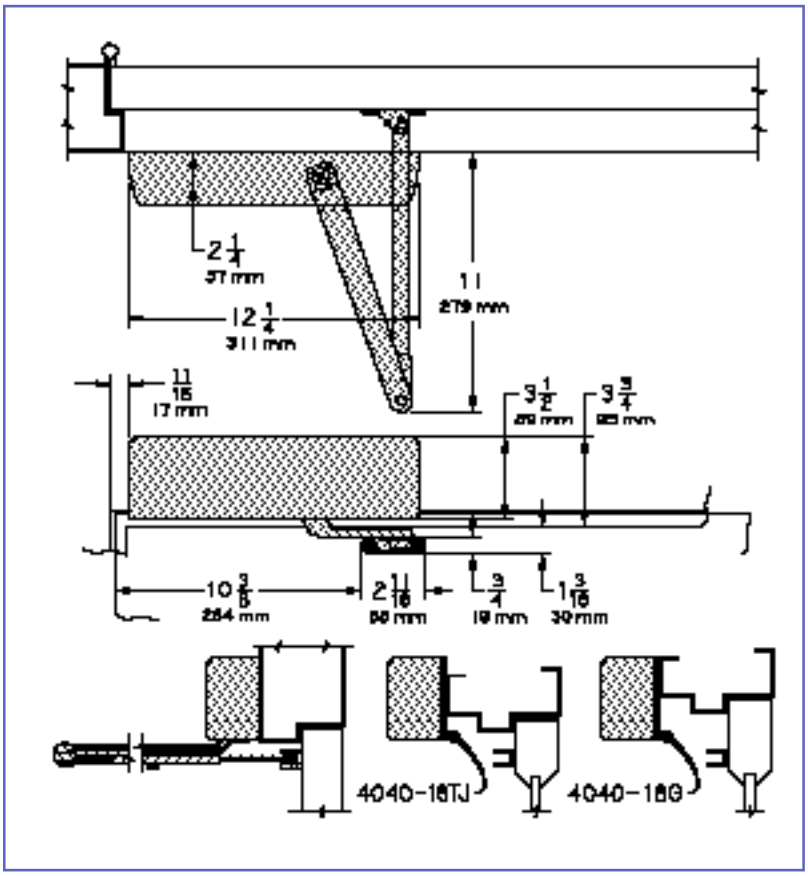
Customized installation templates or products may be available to solve unusual applications. Contact LCN for assistance.



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MOUNTING DETAILS




## TOP JAMB (PUSH SIDE) MOUNTING

## MAXIMUM OPENING

Templating allows up to 120°.

Hold-open points 85° up to 120° with hold-open arm.

- **Butt Hinges** should not exceed 5" (127 mm) in width.
- **Auxiliary Stop** is recommended at hold-open point or where the door cannot swing 120°.
- **Reveal** of 2 9/16" (65 mm) allows 120° opening for REGULAR ARM or standard HOLD-OPEN ARM. 4 13/16" (122 mm) allows up to 120° opening with LONG ARM where standard rod and shoe is replaced with optional LONG ROD AND SHOE 4040-79LR. Use H-LONG ARM with LONG HEAD AND TUBE, 4040-78HL for hold-open. 8" (203 mm) allows up to 120° opening with EXTRA LONG ARM where standard rod and shoe is replaced with optional EXTRA LONG ROD AND SHOE, 4040-79ELR.
- **Top Rail** requires 1 1/4" (32 mm) minimum.
  2 1/4" (57 mm) minimum with closer on PLATE, 4040-18TJ.
  3" (76 mm) minimum with closer on PLATE, 4040-18G.
- **Head Frame** less than 3 1/2" (89 mm) requires PLATE, 4040-18TJ. With flush ceiling, use PLATE, 4040-18G.
  Either plate requires 1 3/4" (44 mm) minimum.
- **Delayed Action** (not available on 4040XP) Add suffix "DEL" to selected cylinder (eg. 4041 DEL). Delays closing from 120° to 80°. Delay time adjustable up to approximately 1 minute.

**Options**

- 4040XP cylinder
- 4041Delayed action cylinder.
- Long arm, extra long arm, hold-open arm, long hold-open arm.
- Metal cover.

**Special Templates**

Customized installation templates or products may be available to solve unusual applications. Contact LCN for assistance.



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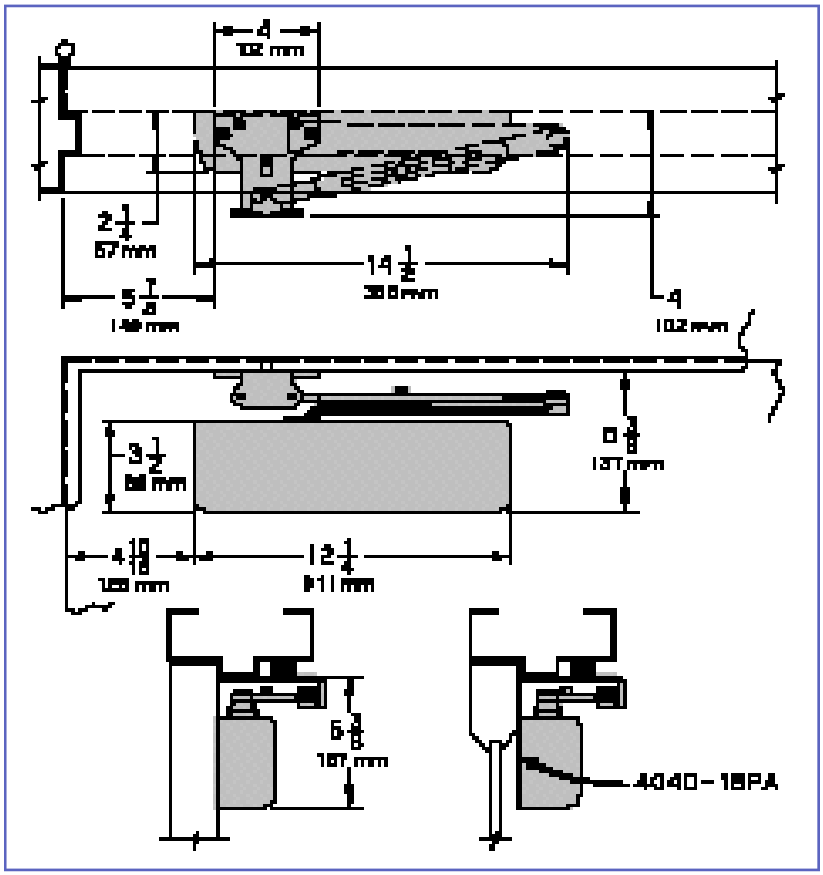
## PARALLEL ARM (PUSH SIDE) MOUNTING

Optional mounting requires PA SHOE, 4040-62PA for REGULAR or HOLD-OPEN arms. Add prefix "P" to closer description (eg. P4041). P4041 closer includes 4040-201 FIFTH HOLE SPACER to support PA SHOE.

## MAXIMUM OPENING

180° opening/hold-open points with all except CUSH arms.

110° opening/hold-open with CUSH arms.




- **Butt Hinges** should not exceed 5" (127 mm) in width.
- **Auxiliary Stop** is recommended at hold-open point, where the door cannot swing 180°, or where CUSH-N-STOP arm is not used.
- **Clearance** for 4040-62PA shoe is 4" (102 mm) from door face.
  EDA shoe projects 5 1/2" (140 mm) from door face.
  CUSH shoe projects 6" (152 mm) from door face.
- **Top Rail** less than 5 3/8" (137 mm) measured from the stop requires PLATE, 4040-18PA. Plate requires 2" (51 mm) minimum from the stop.
- **Head Frame** flush or rabetted requires PA SHOE ADAPTER, 4040-419.
- **Stop Width** minimum 1" (25 mm).
- **Blade Stop** clearance requires 1/2" (13mm) BLADE STOP SPACER, 4040-61.
- **Delayed Action** (not available on 4040XP) Add suffix "DEL" to selected cylinder (eg. P4041 DEL). Delays time adjustable up to approximately 1 minute.

**Options**

- 4040XP cylinder
- 4041Delayed action cylinder.
- Hold-open, EDA, HEDA, CUSH, HCUSH, SPRING CUSH, or SPRING HCUSH arm.
- Metal cover.

**Special Templates**

Customized installation templates or products may be available to solve unusual applications. Contact LCN for assistance.



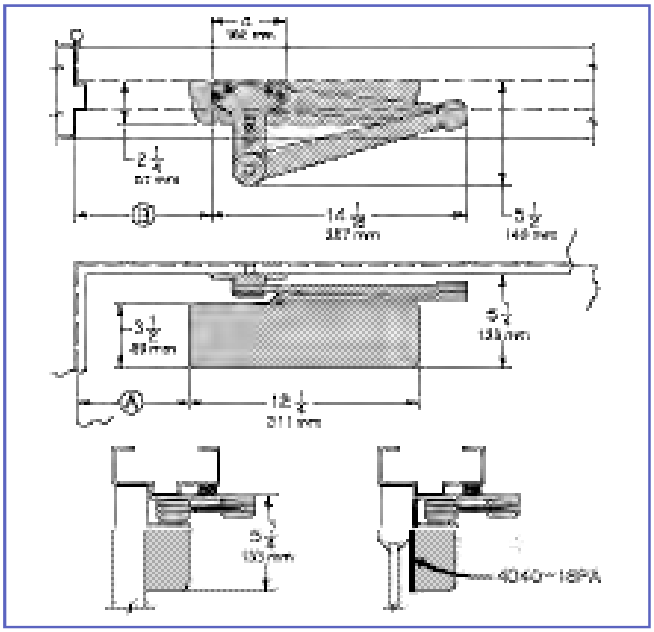
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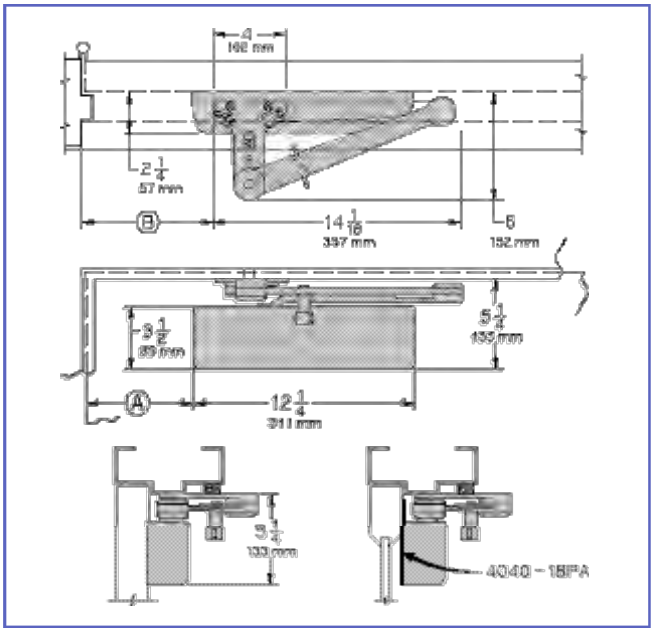
# LCN 4040 SERIES

*Mounting details are the same as 4040 Series REGULAR or HOLD-OPEN except as listed below. 4040 Series closers ordered with EDA or CUSH arms include 4040-201 FIFTH HOLE SPACER to support the shoe.*

## 4040 SERIES EDA MOUNT




## 4040 SERIES CUSH MOUNT




- **Clearance** for 4040-62EDA is 5 1/2" (140 mm) from door face. 6" (152 mm) for CUSH.
- **Head Frame** flush or rabetted requires CUSH FLUSH PANEL ADAPTER, 4040-419.
- **CUSH ARM** requires SHOE SUPPORT, 4040-30 for fifth screw anchorage for narrow frames.
- **Delayed Action** (not available on 4040XP) Add suffix "DEL" to selected cylinder (eg. 4041 DEL). Delays closing from maximum opening to; 115° with 180° template. 95° with 110° template. 85° with 100° template. 75° with 90° template. Delay time adjustable up to approximately 1 minute.

## MAXIMUM OPENING

EDA arm can be templated for points at: 110°,
- (A) = 6 3/8" (162 mm)
- (B) = 7 3/4" (197 mm)

or 180°.
- (A) = 2 7/8" (73 mm)
- (B) = 4 1/4" (108 mm)

Hold-open points up to maximum opening with HEDA arm.

CUSH arms can be templated for opening/hold-open point at:
85°,
- (A) = 7 15/16" (202 mm)
- (B) = 9 1/8" (232 mm)

90°,
- (A) = 7 3/16" (183 mm)
- (B) = 8 1/2" (216 mm)

100°,
- (A) = 6 1/16" (154 mm)
- (B) = 7 1/4" (184 mm)

or 110°.
- (A) = 5 1/16" (129 mm)
- (B) = 6 3/8" (162 mm)

Spring Cush dead stop points are approximately 5° more than templated stop point. Hold open at templated stop points.



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## 8400 Series Protection Plates

- Door protection plates are available in .050" thick brass, stainless steel or aluminum; and 1/8" thick high impact polyethylene in clear or black.
- Bevel edge options; specify B4E for all four edges.
- Mounting screw pack furnished standard, 16 screws per pack. Optional screw packs are available for TEK or TORK screw heads. Refer to the following chart for ordering.
- Specify NMH for no mounting holes.
- Specify NMH-A for no mounting holes with adhesive.
- Specify CS for counter sunk mounting holes.
- Specify ERS prepped with extra row of screws.

**Kickplate Gasket Tape** Tape is recommended when using a brass plate on a metal door to reduce tarnishing from electrolytic oxidation. One tape pack will cover an the perimeters of a 8" x 34" kickplate. Order 8401 Gasket Tape.



**8400 Protection Plate**
**8402 (UL)* Protection Plate**

**UL mark appears in upper right corner.*

Number of screw packs required by plate size (specify TEK Screws or TORK screws).

| | 22"-25" | 26"-33" | 34"-41" | 42"-48" |
|---|---|---|---|---|
| 4"-8" | 1 | 1 | 1 | 1 |
| 9"-16" | 1 | 1 | 1 | 1 |
| 17"-24" | 1 | 1 | 1 | 2 |
| 25"-32" | 1 | 1 | 2 | 2 |
| 33"-40" | 1 | 2 | 2 | 2 |
| 41"-48" | 2 | 2 | 2 | 2 |

**Finishes** *brass*

| US Number | US3 | US4 | US10 | US10B | US15 | US26 | US26D |
|---|---|---|---|---|---|---|---|
| BHMA | 605 | 606 | 612 | 613 | 619 | 625 | 626 |

**Finishes** *stainless steel*

| US Number | US32 | US32D |
|---|---|---|
| BHMA | 629 | 630 |

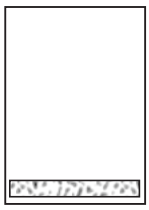
**Finishes** *aluminum*

| US Number | US28 |
|---|---|
| BHMA | 628 |

**Finishes** *plastic*

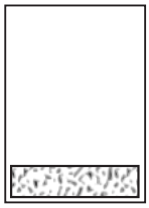
| Clear and Black |
|---|

*Residential Grade Kickplates available Carded only, finishes PA28, PA3, PA619, PA716, B3, B505, B619, B716*



## Mop Plates

- Protect the bottom of the pull side of door subject to cleaning and mopping procedures.
- Size Ranges:4" to 6" high, 22" to 48" wide



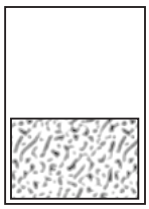
## Kick Plates

- Protect the bottom of the push side of doors subject to scuffing from foot traffic.
- Recommended for all doors subject to normal use (especially doors using a closer).
- Size Ranges: 8" to 24" high, 22" to 48" wide



## Stretcher Plates

- Protect doors at specific areas where consistent contact is made by stretchers, service carts or other equipment.
- Usually applied to push side of doors.
- Specify “B4E” Option for beveled edges.
- Size Ranges: 6" to 8" high, 22" to 48" wide



## Armor Plates

- Protect lower half of doors from abuse by hard carts, trucks and rough usage.
- Usually applied to push side of single doors and both sides of double acting doors.
- Size Ranges: 26" to 48" high, 22" to 48" wide

# Floor Stops – Dome

## **FS436** Dome Stop

**Features:**

- For doors without threshold.
- Heavy-Duty Cast Dome Stops constructed of brass, bronze or aluminum.
- Gray, non-marring rubber bumper.
- Packed with wood screw and plastic anchor, specify Tampin (TPN) or lead expansion shield (LS), if required.
- Meets ANSI/BHMA 156.6, L12141 for brass or bronze and L32141 for aluminum.
- Finishes: US3, US4, US5, US10, US10B, US14, US15, US15A, US26, US26D and US28.



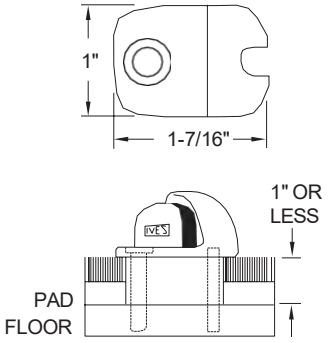
| Product No. | Overall Height | Base Height | Base Diameter |
|---|---|---|---|
| FS436 | 1" | 3/16" | 1-3/4" x 2" Oval |

## **R435** Riser

**Features:**

- Extruded aluminum, mill finish.
- For conversion of FS436 Dome Stop to carpet installation.
- Packed with wood screws, lead shield and stud. Specify Tampin (TPN) if required.
- Available in 1/4", 3/8", 1/2", 5/8", 3/4" and 1" height.






| Product No. | Size |
|---|---|
| R435 | 1" x 1-3/8" Oval |

## How to Order:

**FS___ - ___ - ___ - ___**

**Model:**

| | |
|---|---|
| **436** | Dome Stop Only |
| **435** | Riser Only |
| **436 x 435** | Dome Stop & Riser |

**Riser Size:**

| | |
|---|---|
| **Blank** | No riser |
| **1/4** | for 1/4" |
| **3/8** | for 3/8" |
| **1/2** | for 1/2" |
| **5/8** | for 5/8" |
| **3/4** | for 3/4" |
| **1** | for 1" |

**Finishes:**

US3, US4, US5, US10, US10B, US14, US15, US15A, US26, US26D, US28

**Mounting:**

| | |
|---|---|
| **Blank** | Standard |
| **TPN** | Tampin |
| **LS** | Lead Expansion Shield |

# Floor Stops

## FS18S
## FS18L

**Features:**

- Security Door Stops designed for use in high vandalism areas.
- Molded from flame resistant, resilient material around a heavy-duty stud.
- Once grouted in concrete, leaves no exposed fasteners to be tampered with or removed.
- Ideal for jail or security cell areas where floor mounted stops are required.
- FS18L also ideal for concrete wall applications.
- Finish: Black.

| Product No. | Stop Height | Stop Diameter | Stud Length |
|---|---|---|---|
| FS18S | 1-1/2" | 2" | 2-1/2" |
| FS18L | 3-1/2" | 2" | 2-1/2" |



FS18S



FS18L

## FS434

**Features:**

- Burnished wrought steel.
- Soft, resilient gray rubber.
- For undercut doors up to 1-1/2".
- Packed with screws and plastic anchors.
- Finishes: US2C, US10.

| Product No. | Overall Height | Base Size |
|---|---|---|
| FS434 | 2-5/8" | 1-1/2" W x 2-3/4" L |



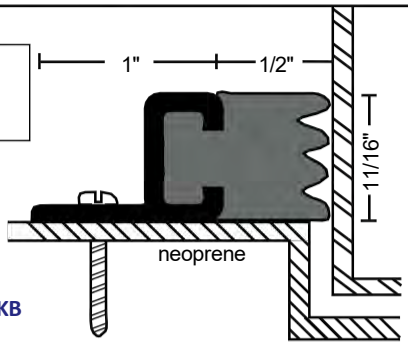
Toll Free Phone 1-800-647-7874
Toll Free Fax 1-800-255-7874



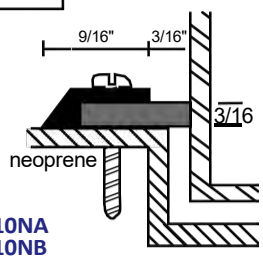
All products this page.

#6 x 3/4" Stainless Steel Sheet Metal Screws furnished.

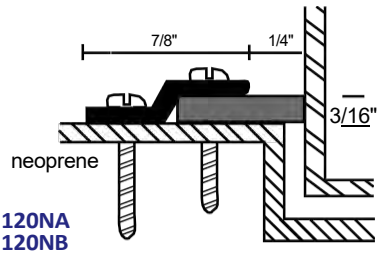
A - clear
B - gold
DKB - dark bronze
neoprene is black



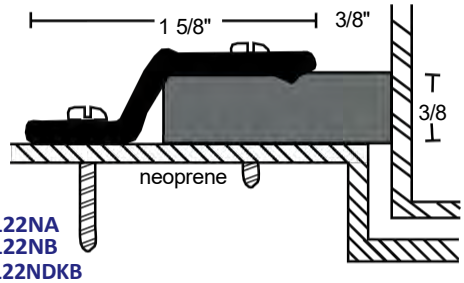

**108NA**
**108NB**
**108NDKB**



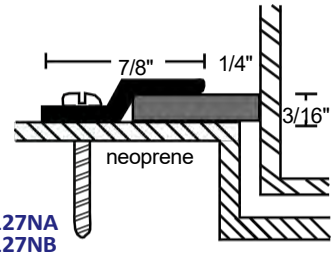

**110NA**
**110NB**
**110NDKB**



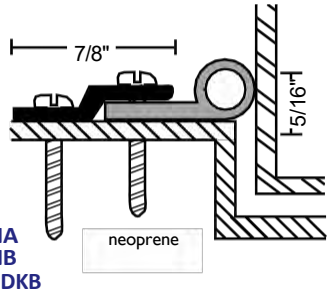

**120NA**
**120NB**
**120NDKB**



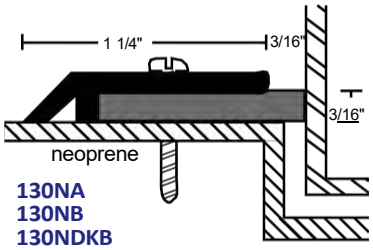

**122NA**
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**122NDKB**



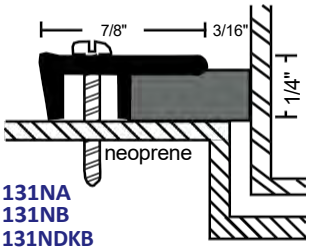

**127NA**
**127NB**
**127NDKB**



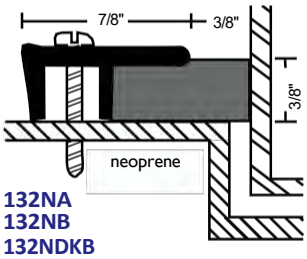

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**129NB**
**129NDKB**



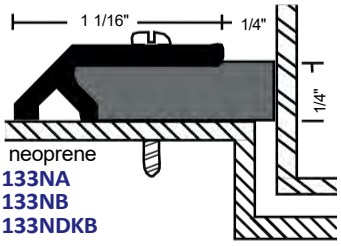

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**130NB**
**130NDKB**



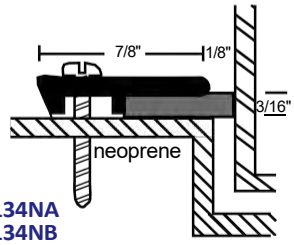

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**131NB**
**131NDKB**



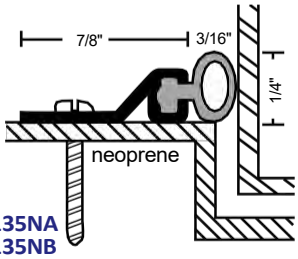

**132NA**
**132NB**
**132NDKB**



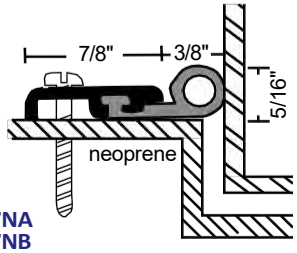

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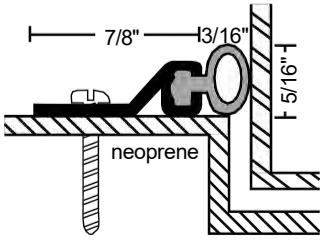

**134NA**
**134NB**
**134NDKB**




**135NA**
**135NB**
**135NDKB**

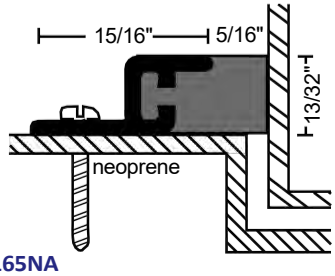



**137NA**
**137NB**
**137NDKB**




**161NA**
**161NDKB**

.07 aluminum for military specs




**165NA**
**165NDKB**



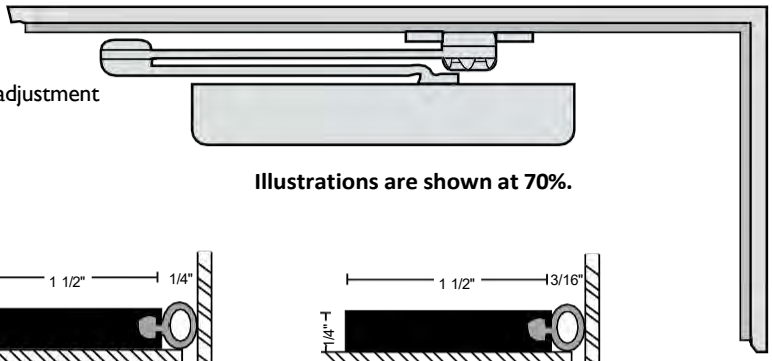
E-mail: ngpinfo@ngpinc.com
www.ngpinc.com

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Toll Free Fax 1-800-255-7874

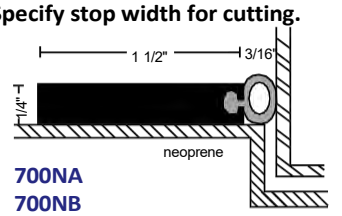


With 700 Series:

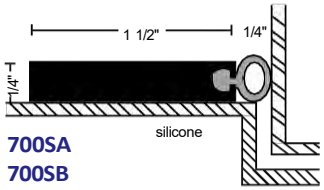
* No break in seal
* Head not drilled
* Side sections are furnished with slotted holes for adjustment
* Comes with self drilling #8 (Tek type) screws.
* Bracket or closer and/or hold open device to be attached to frame through weatherstrip section.
* **May be cut to fit narrow frame stops. Specify stop width for cutting.**



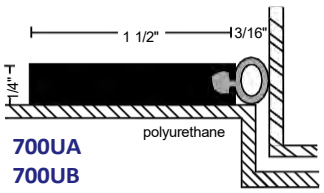
**Illustrations are shown at 70%.**



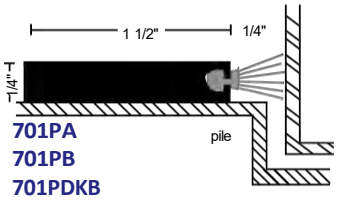

**700NA**
**700NB**
**700NDKB**



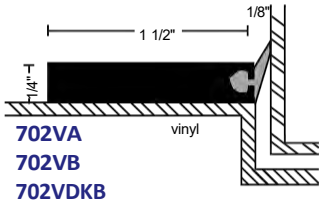

**700SA**
**700SB**
**700SDKB**



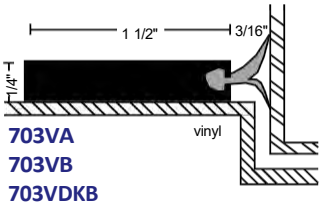

**700UA**
**700UB**
**700UDKB**



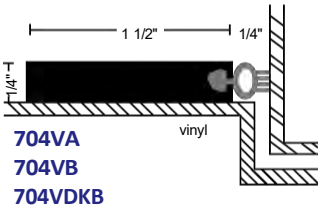

**701PA**
**701PB**
**701PDKB**



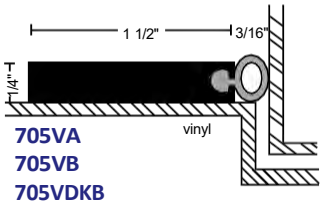

**702VA**
**702VB**
**702VDKB**



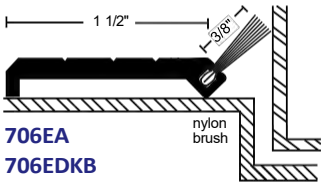

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**703VB**
**703VDKB**



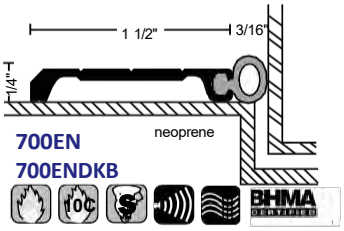

**704VA**
**704VB**
**704VDKB**



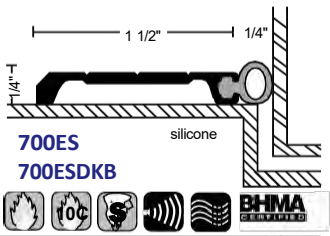

**705VA**
**705VB**
**705VDKB**



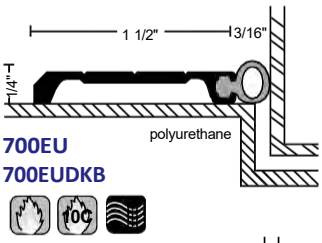

**706EA**
**706EDKB**



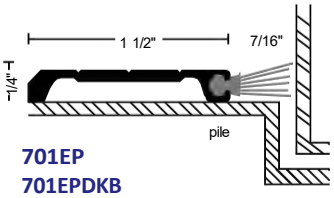

**700EN**
**700ENDKB**



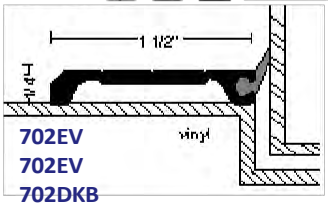

**700ES**
**700ESDKB**



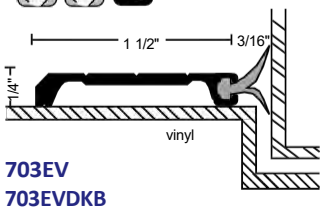

**700EU**
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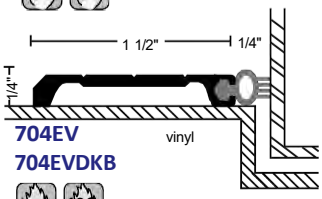

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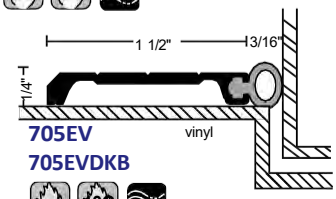

**702EV**
**702EV**
**702DKB**




**703EV**
**703EVDKB**




**704EV**
**704EVDKB**




**705EV**
**705EVDKB**

**A** - clear
**B** - gold
**DKB** - dark bronze
vinyl & pile are gray
neoprene, silicone, polyurethane, brush are black

See page 59 for our Premium Grade Allseal® Seals for use with parallel arm closers.



E-mail: ngpinfo@ngpinc.com
www.ngpinc.com

# National Guard Products, Inc.

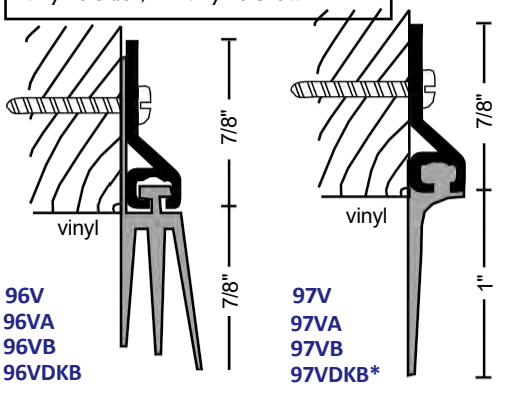
PROTECTION, INSIDE OUT

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Toll Free Fax 1-800-255-7874


vinyl is gray. Exceptions:
*vinyl is black, ** vinyl is brown

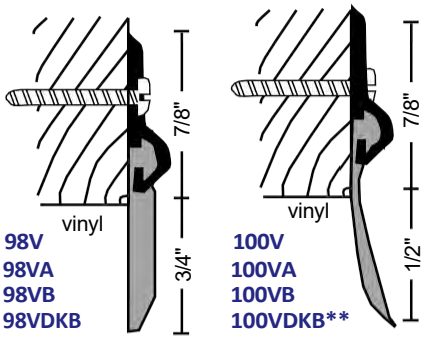
#6 x 3/4" stainless steel sheet metal screws furnished.

neoprene, polyurethane are black
silicone is gray



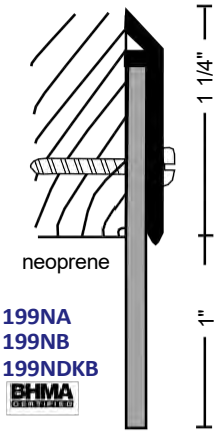

**96V**
**96VA**
**96VB**
**96VDKB**

**97V**
**97VA**
**97VB**
**97VDKB***

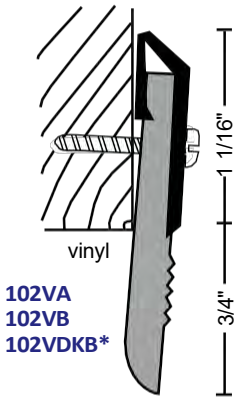



**98V**
**98VA**
**98VB**
**98VDKB**

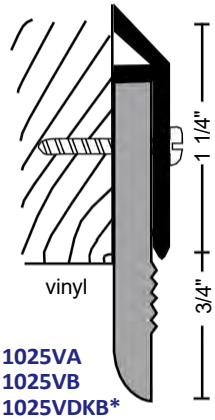
**100V**
**100VA**
**100VB**
**100VDKB****



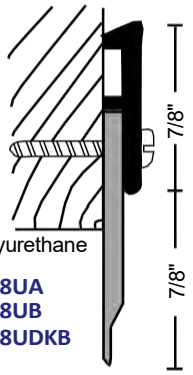

**199NA**
**199NB**
**199NDKB**
BHMA



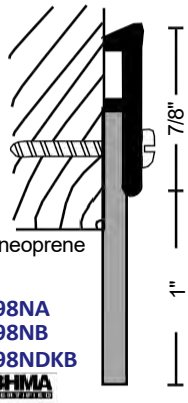

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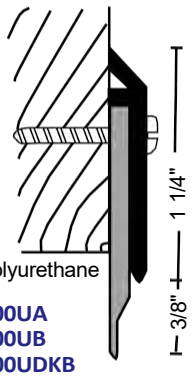

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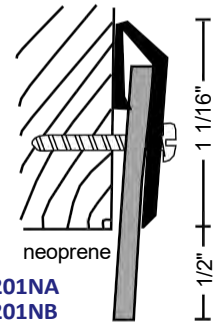

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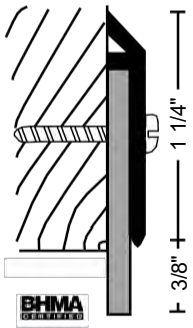

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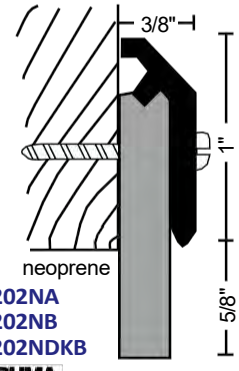



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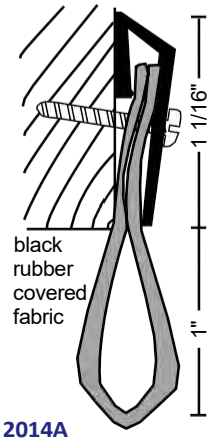

neoprene
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**200NB**
**200NDKB**
BHMA

silicone
**200SA**
**200SB**
**200SDKB**
BHMA

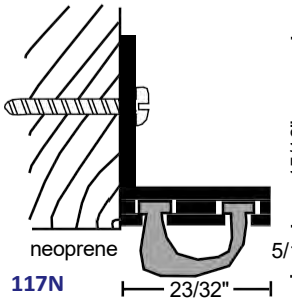



**202NA**
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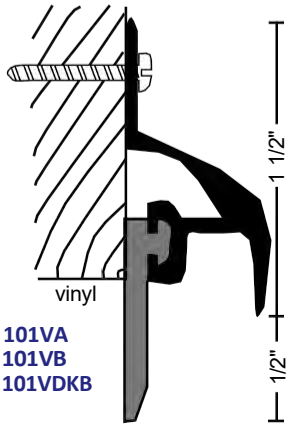
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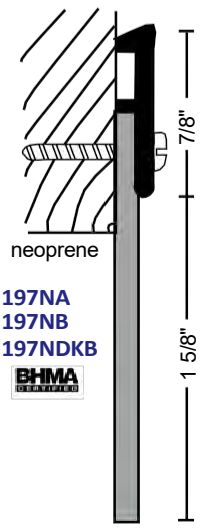

**2014A**
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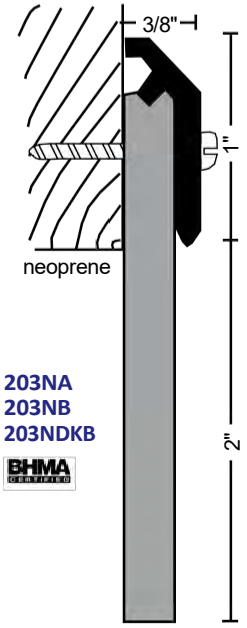

**117N**
**117NDKB**
BHMA




**101VA**
**101VB**
**101VDKB**




**197NA**
**197NB**
**197NDKB**
BHMA




**203NA**
**203NB**
**203NDKB**
BHMA




E-mail: ngpinfo@ngpinc.com www.ngpinc.com

# SECTION 09300

# TILE

## PART 1 - GENERAL

### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide ceramic tile finish, complete.

A. Work In This Section: Principal items include:

1. Glazed ceramic tile walls and bases.
2. Unglazed quarry tile floors.
3. Expansion joints.
4. Marble thresholds at tile floors.

B. Related Work Not In This Section:

1. Cement plaster scratch coat backing for tile walls and bases.
2. Concrete subslabs.
3. Bituminous membrane waterproofing.
4. Metal thresholds.

### 1.02 QUALITY ASSURANCE:

A. Reference Standards: Conform to the following standards unless otherwise required herein:

1. American National Standards Institute (ANSI):

A108.1A Installation of Ceramic Tile in the Wet-set Method with Portland Cement Mortar

A108.1B Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-set or Latex-Portland Cement Mortar

A108.10 Installation of Grout in Tile Work

A118.4 Latex-Portland Cement Mortar

A137.1 Standard Specifications for Ceramic Tile

2. Tile Council of America (TCA):

2013 Edition, Handbook for Ceramic Tile Installation

B. Tile flooring demonstrating a coefficient of friction of at least 0.6 when tested in accordance with ASTM C 1028 will be considered as meeting the intent of slip resistance.

1.03 SUBMITTALS:

A. Shop Drawings: Submit showing dimensioned layouts for all tiled wall and floor surfaces. Show locations of tile joints, cuts and trimmers. Identify trimmers and accessory units by type number stated in the approved product data.

B. Product Data: Submit the following:

1. Tile manufacturer's printed data identifying each field tile unit and each trimmer and shaped unit by manufacturer's model or type number.

2. Manufacturer's printed directions for Portland cement grout.

C. Samples: Submit the following for selection and approval:

1. Each type, shape and trimmer of tile in each color proposed for use.

2. Grout colors for each type of tile.

3. Cured sealant colors for expansion joints in tile.

4. Marble thresholds, 12" lengths, with one end cut and finished to fit typical door jamb.

D. Master Grade Certificates: Submit for each lot of tile before installing.

E. Test Data: Submit records of test for dryness of subfloors to receive thinset floor tile.

F. Certificate: Submit certificate from independent testing laboratory attesting to non-slip characteristics of floor tile as specified.

G. Extra Material: Furnish the Owner with one unopened box or bundle of each type, size and color of tile used on the project. Label each box with the type, size, color and location in the building. Delver to Owner's on-site storage area as directed.

1.04 PRODUCT DELIVER AND STORAGE:

Deliver tile materials to site in unopened factory containers sealed with Grade Seals bearing printed name of manufacturer and the words "Standard Grade". Keep the grade seals intact and containers dry until tiles are used. Keep cementitious materials dry until used.

1.05 JOB CONDITIONS:

A. Conditions: Inspect and verify conditions and substrates and report defects for correction before proceeding. Walls shall be leveled and plumbed square.

B. Protection: Install temporary protection as required. Do not use lumber or other material likely to strain or deface installed tile. Close tile floors to traffic completely for 72 hours after tile installation; thereafter, permit traffic only over protective covering of heavy paper or equivalent.

PART 2 – PRODUCTS

2.01 BASIC MATERIALS:

A. Portland cement: ASTM C150, Type I or II, low alkali.

B. Hydrated lime: ASTM C207, Type S.

C. Mortar sand: ASTM C144, at least 4% passing No. 100 sieve.

D. Joint sand: Same as mortar sand except all passing the No. 30 sieve.

E. Water: From domestic potable source.

F. Waterproofing admix: Anti-Hydro, Sika Red Label Suconem, or equal.

G. Fiberglass tape: Approved brand of glass reinforced tape, 2” wide minimum.

H. Latex liquid: Styrene-butadiene rubber liquid latex, by the same manufacturer as above latex mortar mix.

I. Color pigments: Pure ground mineral oxides, non-fading, alkali and lime proof, factory weighed and packaged.

J. Sealer: Custom Building Products “Tilelab Surfacegard Sealer”, water soluble, polymer type, low VOC.

K. Portland Cement Grout: Custom Building Products Polyblend 145, colors as directed.

L. Edge Strips: Manufactured by Schluter, 194 Pleasant Ridge Road, Plattsburgh, NY 12901, (800) 472-4588, fabricated of extruded aluminum, satin anodized, transition sections and thicknesses as required for tile setting materials and adjoining finishes.

2.02 TILE MATERIALS:
(See District Standard Color Selection Schedule at end of PART 3)

A. General Requirements:

1. Mesh mounted or perforated paper backed tile is not acceptable where the mesh or paper remains as a permanent part of the installation.

2. Under no circumstances will glazed tile installations be accepted if any part of unglazed tile body of any unit remains exposed after tile is installed. Provide matching tile trimmers of all types required to prevent such condition.

B. Glazed Wall Tile: Dal Tile, District standard, colors and sizes as selected or scheduled, dust pressed and white body, square edged, two integral joint spacing lugs on edges with matching integral cove base, integral surface bullnose for external angles and exposed edges.

C. Unglazed Mosaic Floor Tile: Dal Tile, District Standard, colors and sizes as selected or scheduled, porcelain unglazed ceramic mosaic tile. Tile flooring shall be slip resistant (CBC 11B-302).

2.03 SETTING BED MORTAR:

Machine mix mortar after first dry mixing materials. Mix all mortar not less than 5 minutes after water is first added. Accurately measure materials using calibrated measuring boxes; shovel measurement is not permitted. Discard mortar that is not placed and compacted before initial set is reached. Measure all materials by volume.

A. For Wall Tile: Quantity ranging from 1-part Portland cement, 1/2-part hydrated lime, and 5-parts damp sand to 1-part Portland cement, 1-part hydrated lime and 7-parts damp sand.

B. For Floor Tile: Quantity of 1-part Portland cement, 1/10-part hydrated lime and 6-parts damp sand, mixed to consistency and workability that allows maximum compaction during tamping of mortar bed.

2.04 BOND COAT:

White or gray Portland cement mixed with latex admix to creamy consistency. For glazed wall tile, gray or white dry-set Portland cement mortar mixed in the same manner may be used. Do not add water or cement after initial mixing, and discard material not used prior to initial set.

2.05 MARBLE THRESHOLDS:

Group “A” marble as classified by the Marble Institute of America, 1-piece units and honed finish and rounded edges, accurately cut to profile of door jambs, color as selected, matching approved Sample.

2.06 EDGING ANGLES:

Extruded aluminum or stainless steel of minimum 1/8” leg thickness, as approved.

PART 3 – EXECUTION

3.01 PREPARATION:

Clean substrates of dust, dirt, oil, grease and deleterious substances. Conform to applicable Reference Standards and to recommendations of manufacturers of materials used.

A. Concrete Slabs to Receive Mortar Setting Beds: Keep concrete damp for at least 8 hours and scrub with a neat Portland cement slurry just before placing setting bed mortar.

B. Tile Wetting: Soak mortar-bed set glazed tile in clean water according to Reference Standard. Dampen other tile according to Reference Standards or tile manufacturer's instructions.

C. Screeds: Accurately set temporary screeds to control the finish plane of mortar-bed set tile and remove as soon as setting bed is sufficiently hardened. Fill void spaces from screeds with same mortar.

3.02 TILE SETTING METHODS:

Unless more stringent requirements are indicated or specified, tile setting methods shall conform to the following TCA Handbook Methods:

| | |
|---|---|
| Walls, mortar set, wood framing | W231 |
| Floors, mortar set, bonded | F112 |

3.03 TILE INSTALLATION:

Arrange tile surfaces according to patterns detailed or approved.

A. Accurately set all tile with flush well-fitted joints, finished in true planes, plumb, square, sloped or level as required. Neatly cut and fit the tile close against abutting surfaces. Construct joints of uniform width. Form corners, returns and exposed tile edges with approved trimmers. Drill and cut tile without marring. Carefully grind tile edges and cuts smooth. Fit tile close around outlets, pipes and fixtures so that escutcheons or collars overlap tile. Arrange tile surfaces so that not less than half-size tile occurs. Drill holes for pipe penetrations through wall tile; do not cut or split tile and set with tight ungrouted joint.

B. Pea Gravel: Prior to installing mortar setting beds at floor drains, provide pea gravel at base of drain over weep holes to insure positive drainage and prevent mortar from clogging weep holes.

C. Mortar Bed Set Tile: Apply specified setting bed mortar, tamp and screed to required planes. Spread no more mortar than can be covered with tile before mortar initially sets. Do not use retempered mortar. When mortar has stiffened sufficiently, sharp trowel cut through entire setting bed at corners and angles and vertically at nominal 24" centers in the field. Place tiles to avoid small or unsightly cuts and set with uniform joint width. Trowel 1/32" to 1/16" thick bond coat over plastic setting bed mortar just before setting tile or apply bond coat to back of each tile as placed; use white bond coat where tile joints occur. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and proper plane. Complete all beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding use of excess water. At this time adjust all out-of-line or out-of level tile.

D. Joint Sizes: Install tile with uniform joint widths as follows:

1. Glazed wall tile, 1/16".

2. Floor tile, 1/16”.

E. Ceramic Tile Joint Grouting: Grout tile joints full. Mix grout with water to a thick creamy consistency and force into joints for entire joint depth, flush with surface. Clean off all excess and fill skips and gaps before grout sets. Provide dampness for minimum 3-day curing and polish with clean dry cloths.

F. Caulking: Caulk penetrations through wall tile with latex mortar or sealant conforming to Section 07920, concealed by collars or escutcheons.

3.04 SEALING:

Tile and grout joints shall be cleaned, allowed to dry and sealed with one coat of sealer.

3.05 CLEANING:

Remove stains, cement, grout and foreign matter after grouted joints are fully set. Do not use any acid for cleaning. Repair all defective joints as approved.

3.06 DISTRICT STANDARD COLOR (DAL-TILE) SCHEDULE

| | | |
|---|---|---|
| Floor | 6”x6” Unglazed | Suede Gray Speckle B932 |
| Floor | 6”x6” Unglazed | Uptown Taupe Speckle B930 |
| Wall (Field) | 4”x4” Glazed | Elemental Tan 0166<br>Laticrete 254 Platinum Thin Set Mortar<br>(No Mortar Substitutes) |
| Wall (Field) | 4”x4” Glazed | Arctic White 0190<br>Laticrete 254 Platinum Thin Set Mortar<br>(No Mortar Substitutes) |
| Wall (Field) | 4”x4” Glazed | Black K111<br>Laticrete 254 Platinum Thin Set Mortar<br>(No Mortar Substitutes) |
| Wall (Field) | 4”x4” Glazed | Desert Gray X114<br>Laticrete 254 Platinum Thin Set Mortar<br>(No Mortar Substitutes) |
| Wall (Accent) | 4”x4” Glazed | Oak Moss (Green) 0195<br>Laticrete 254 Platinum Thin Set Mortar<br>(No Mortar Substitutes) |
| Wall (Accent) | 4”x4” Glazed | Galaxy (Blue) 1469<br>Laticrete 254 Platinum Thin Set Mortar<br>(No Mortar Substitutes) |
| Wall (Accent) | 4”x4” Glazed | Vermillion Red 0DM1 |

| | | |
|---|---|---|
| | | Laticrete 254 Platinum Thin Set Mortar<br>(No Mortar Substitutes) |
| Wall (Accent) | 4”x4” Glazed | Sunflower Yellow DH50<br>Laticrete 254 Platinum Thin Set Mortar<br>(No Mortar Substitutes) |
| Interior Wall<br>(At Drinking Fountain<br>Elementary School) | 2”x2” Glazed | Urban Putty 0161/ Elemental Tan 0166 |
| Exterior Wall<br>(At Drinking Fountain<br>Elementary School<br>With Birchwood Paint) | 2”x2” Glazed | Urban Putty 0161/ Elemental Tan 0166 |
| Exterior Wall<br>(At Drinking Fountain<br>Elementary School<br>With Lamps End Paint) | 2”x2” Glazed | Desert Gray x114/ Suede Gray 0182 |

END OF SECTION

# SECTION 09510

# ACOUSTICAL CEILINGS

## PART 1 - GENERAL

### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide acoustical ceilings as indicated, specified and required.

A. Work In This Section: Principal items include:

1. Suspended exposed grid acoustical unit ceilings.
2. Metal trims and mouldings.
3. Adhesive-applied acoustical units.

B. Related Work Not In This Section:

1. Air conditioning grilles and fixtures.
2. Lighting fixtures and wiring.

C. Description of Ceilings:

1. Exposed grid, 24” x 48” acoustical units, non-rated.
2. Adhesive-applied 12” square acoustical units.

### 1.02 SUBMITTALS:

A. Shop Drawings: Submit shop drawings showing fully dimensioned reflected ceiling plans, grid system details, seismic bracing, hanger wire connections to supports and connection to other materials including light fixtures and diffusers and grilles.

B. Samples: Submit samples of acoustical units and of each grid component with metal trims and mouldings.

C. Installation Instructions: Submit grid manufacturer’s complete installation instructions.

D. Maintenance Material: Deliver, in unopened cases, at least 1 percent of total quantities of each type of acoustical unit installed in the work.

### 1.03 PRODUCT DELIVERY, STORAGE AND HANDLING:

Deliver materials to the site in manufacturer’s original unopened containers. Keep all materials dry, clean and protected from deterioration.

1.04 JOB CONDITIONS:

A. Verify the locations of various electrical and mechanical fixtures and equipment items installed above ceilings and the required access to dampers, valves, controls and similar items. Coordinate locations of hanger wires and ceiling installations with all such fixtures and equipment to obtain neat symmetrical result with minimum cutting or patching of acoustical units.

B. Building shall be enclosed, with all windows and exterior doors in place and glazed, and the roof watertight before installation of suspension system. Permanent HVAC systems shall be complete and operational.

C. Maintain interior temperatures between 60 degrees F and 85 degrees F, and relative humidity of 70 percent or less for 7 days prior to installation of ceilings, and continuously thereafter until final acceptance.

1.05 QUALITY CONTROL:

Finished ceiling shall be level within a tolerance of 1/8” in 12’ in any direction, non-accumulative.

1.06 WARRANTY:

Furnish warranty against defects in materials or workmanship including sagging or disconnection of grid systems or disintegration of acoustical units, for a period of 3 years.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

District Standard for types indicated. No substitutions.

Armstrong World Industries, Inc.
150 N. Queen St.
P.O. Box 3001
Lancaster, PA 17603
(888) 234-5464

USG Corporation
3633 E. Inland Empire Blvd., Suite 450
Ontario, CA 91764
(310) 479-2125

2.02 ACOUSTICAL UNITS:

A. Flame Spread Rating: Furnish incombustible acoustical units rated 0 to 25 flame spread rating (Class I) per ASTM E84 Tunnel Test.

B. Acoustic Tile: Armstrong Fine Fissured 741- White, 12” by 12”, 5/8” thick, T & G edge.

C. Lay-in Acoustical Ceiling Panels: USG Fissured; random fissured; 5/8” thick; square edged; white.

2.03 GRID SUSPENSION SYSTEMS:

Designed to support acoustical ceiling loads with deflections not over 1/360 of spans, manufactured of zinc-coated steel, size punching and finish to match and be compatible with existing.

A. Manufacturer: Donn, as recommended by tile and panel manufacturer for each condition, unless specified otherwise hereafter.

B. Exposed Grid System: Manufacturer and type indicated on drawings. Conform to ASTM C635, heavy-duty grid bearing UL label or listing as a 4-pound grid. Provide bulb-top main tees at least 1-1/2” high, cross tees of same type except may be 1” high, tees with nominal 15/16” wide bottom flanges. Factory finish exposed grid surfaces with baked low-luster enamel of color to match acoustical units.

C. Trims and Moldings: Of minimum 0.024” thick zinc-coated steel, exposed surfaces factory painted with low luster enamel in color to match grid.

D. Hanger Wires: Minimum 12 gauge galvanized annealed steel wires. Furnish heavier gauge if required by code or UL Design Approval for ceiling grid system furnished.

E. Splay Wires and Compression Struts: Of approved manufacturers, acceptable to manufacturer of ceiling grids, gauges and types as required by building codes for ceiling types and weights specified.

F. Splines: Approved metal or plastic types.

2.04 ADHESIVE:

One of the following:

Franklin International “Titebond Solvent Free Acoustical Ceiling Adhesive”.
MacklanBurg “Duncan/Acoustical Ceiling Tile Adhesive”.
TACC “Miracle Water Based Ceiling Tile Adhesive”.

PART 3 – EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS:

Install ceilings in accordance with approved submittals, the grid and tile or panel manufacturer’s printed instructions, and details shown on drawings and DSA IR M-3. Coordinate installation of all items specified under other sections in and above ceilings. Install suspended ceilings level within specified tolerance in all directions. Conform to approved submittals. Inspect and verify existing conditions.

A. Pattern: Unless otherwise indicated or specified, install ceilings in a regular pattern without border, joint lines parallel to walls. Install units symmetrically about centerlines

of each room or space, avoiding narrow units at walls. Cut and closely fit units to ceiling penetrations.

B. Framing for Lighting and Mechanical Equipment: Coordinate all work installed in ceilings, and provide additional hanger wires, framing members and supports in grids as required for lighting and mechanical fixtures, equipment and all other loadings imposed on grids, with a safety factor of 4.0 minimum. Provide main grid tees along edges of mechanical and lighting fixtures bearing on the grids.

C. Seismic Bracing: Provide splayed seismic bracing wires as indicated and required by code.

3.02 SUSPENDED GRID CEILINGS:

Conform to the UL Design Approval for the grid.

A. Hanger Wires: Space hanger wires at maximum 48” centers along main tees and connect to structure above as shown in approved submittals.

B. Grid Members: Space main tees at maximum 48” centers and install cross tees to complete the grid. Lock suspension members together to form joints that resist 100 pounds tension and compression. Cope bottom flanges of tees, where exposed, for flush tight connections with metal trims at vertical surfaces. All attachments shall be concealed. Pop rivets or other exposed fasteners will not be acceptable.

C. Exposed Grid Acoustical Units: Install units with edges bearing on tees and secured with hold-down clips. Closely fit units to ceiling penetrations.

D. Trims and Moldings: Provide painted metal trims and moldings at walls and other vertical surfaces and penetrations, joints closely butted, mitered at angles and flush. Lapped joints are not permitted. All attachments shall be concealed. Pop rivets or other exposed fasteners will not be acceptable.

E. Ceiling Offsets: Provide framing, trims and other finishing materials as indicated or required to properly finish at offsets or ceiling breaks, types as indicated, directed and approved.

F. Leveling: After lighting fixtures and lenses are in place, adjust to level within tolerances specified above. After leveling is complete, neatly twist ends of hanger wires around suspended sections and cut off loose ends.

3.03 ADHESIVE-APPLIED ACOUSTICAL UNITS:

Remove dust, dirt, greases, oil and other deleterious substances from solid backing, and apply primer if recommended by the adhesive manufacturer. Secure each unit with not less than four pats of adhesive, each pat at least 2” diameter. Place units in position with a forward and backward sliding motion while pressing the units against the solid backings. Install splines

between edges of units that are not self-aligning type. Install painted metal trims or moldings at walls or other vertical surfaces. Accurately scribe units to penetrations. Install units in a true plane, free of offsets at joints or improper jointing.

3.04 REPAIR, CLEANING AND COMPLETION:

Remove and replace discolored, broken or damaged materials. Completed ceilings shall present a smooth plane surface free of edge or corner offsets or breaks, cupping, scratches, gouges stains or hand marks, or other defects. Clean exposed surfaces and remove foreign matter.

END OF SECTION

# SECTION 09680

# CARPET

## PART 1 - GENERAL

### 1.01 DESCRIPTION:

Division 1 applies to this Section.

A. Work In This Section: Carpet and accessories, complete.

B. Related Work Specified Elsewhere: Testing and leveling subfloors to received carpet.

### 1.02 QUALITY ASSURANCE:

A. Requirements of Regulatory Agencies: Carpeting shall meet requirements of Federal, State and Local Regulatory Agencies for flammability, static control or other properties as required and as specified herein.

B. Carpet Installation: Comply with Carpet and Rug Institute “Standard for Installation of Textile Floorcovering Materials, CRI-104. Firm performing the installation shall be certified by the Floor Covering Installation Board. At least one of the installation crew shall have Master Installer certification of the International Certified Floorcovering Installers Association.

### 1.03 SUBMITTALS:

A. Layout Shop Drawings: Submit showing dimensioned layout of all seams in carpet and cushion, location of dye lot changes and details for binder bars. Indicate doorways, enclosing walls or partitions, built-in cabinets and locations where cutouts are required in carpet. Approval does not relieve the Contractor of responsibility for the satisfactory installation of carpet.

B. Samples:

1. Submit three labeled minimum 18” square samples from each dye lot of carpet required for the work. Samples shall demonstrate that dye lots acceptable match and there will be no apparent color change between carpet pieces of different dye lots.

2. Sample installations: Prepare as many sample installations as are required for approval. Use the preparation techniques, installation materials conforming to approved submittals and installation methods proposed for the work. Installations will be closely examined for workmanship, appearance, alignment and preservation of carpet pattern, non-detectibility of seams when viewed from any direction or distance at the height of a standing of sitting person, and freedom from manufacturing or installation defects of any kind. Finally approved sample

installations establish the quality required for all carpet installations, shall be identified and recorded, and shall remain in place.

3. Trim and accessories: Submit 12” long samples of each type trim proposed for the work.

C. Product Data: Submit the following:

1. Carpet manufacturer’s published technical data fully describing carpet materials, construction and recommended installation directions. Indicate special procedures and perimeter conditions requiring special attention.

2. Technical data and usage instructions for each adhesive and sealer material.

3. Carpet manufacturer’s published instructions for maintenance care, cleaning and repair of carpet.

D. Certificates:

1. Submit independent laboratory reports showing compliance with following requirements as specified:

a. ASTM E-662: Smoke Density
b. AATCC 134: Electrostatic Propensity
c. CRI TM-102: Fluorine Analysis
d. ASTM D-3936: Delamination

2. Recycling Program: Provide certification by independent testing agency of manufacturer’s capability to recycle the carpet, as specified below.

3. Indoor Air Quality: Submit report showing CRI Green Label Certification Number for carpet (inclusive or adhesive).

E. Test Reports: Submit test reports showing compliance with performance characteristics specified hereafter.

F. Maintenance Materials: Provide 5 percent of carpet, in rolls, for maintenance purposes. Deliver to Owner’s on site storage location as directed. Deliver all unused carpet and large scraps to Owner. Dispose of scraps less than 2 square foot in area or less than 8 feet in width.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver materials in original unbroken packages, containers or bundles bearing name of manufacturer, complete material identification, brand and grade.

B. Store in a dry location, between 60 degrees F and 80 degrees F and a relative humidity below 65 percent. Protect from damage and soiling. Stack carpet rolls horizontally on a flat surface, stacked not higher than two rolls.

C. Handle by methods that prevent damage, soiling and contamination. On delivery of carpet material, bale ticket on each roll shall be recorded by Contractor. Carpet shall not be folded for more than 4 hours.

D. Store materials in area of installation for minimum period of 48 hours prior to installation.

1.05 JOB CONDITIONS:

A. Ventilation and Temperature: Verify areas to be carpeted are ventilated to remove fumes from installation materials, and areas are within temperature range recommended by the various material manufacturers for site installation conditions.

B. Protection: Keep traffic and personnel off carpet until at least 12 hours after installation. Cover carpet with heavy non-staining kraft paper or equal in areas where the work of other trades is to be performed and passage areas. Protect carpet from damage or soiling. Keep protection in place until ready for final clean-up operations.

1.06 ENVIRONMENTAL REQUIREMENTS:

A. Carpet shall meet FTC guides for recyclability and shall be 100 percent closed-loop recyclable back into carpet. No portion of the product may be landfilled or incinerated (including waste-to-energy).

B. Recycling Program: Manufacturer shall have a collection and recovery system for product and a fully established, currently operational recycling program in accordance with FTC guides Section 260.7 (d). Manufacturer shall be able to reclaim and recycle 100% of existing carpet of similar composition back into carpet. Manufacturer shall have a product take-back program and shall be able to reclaim and recycle 100% of installed product back into carpet at the end of its service life.

C. Indoor Air Quality: Carpet shall have low VOC, factory applied, dry adhesive. Carpet, inclusive of floor covering adhesive, shall meet CRI's IAQ requirements for carpet only. Environmental chamber testing per ASTM D-5116. Emission Rates determined at 24 hours. Carpet, inclusive of pre-applied adhesive shall off gas less than:

0.5 mg/sq. meter per hour of Total Volatile Organic Compound (TVOC)
0.05 mg/sq. meter per hour of formaldehyde
0.4 mg/sq. meter per hour of styrene, and
0.05 mg/sq. meter per hour of 4-Phenyl Cyclohexene (4-PC)

1.07 WARRANTY:

A. Extended Warranty: Provide warranty for non-prorated period of 25 years, against the following:

1. Excessive Surface Wear: More than 15% loss of pile fiber weight
2. Excessive Static Electricity: More than 1.5 kV per AATCC 134
3. Resiliency Loss of the Backing: More than 10% loss of backing resiliency
4. Delamination
5. Edge ravel

6. Zippering

B. Warranty required under Division 1 shall include trimming, relaying, restretching or replacement as necessary, at no additional contract cost.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER:

Tandus Flooring/A Tarkett Company
311 Smith Industrial Blvd.
Dalton, GA 30721
(800) 248-2878

2.02 CARPET:

Tandus Flooring/A Tarkett Company: Applause III Style; Color to be selected from District standard color choices: “Tapestry”, “Carnival”, “Lapis”,or “Mineral”; No substitutions.

A. Provide glue-down or firm cushion installation that complies with CBC Section 11B-302.2.

B. Carpet shall have a level loop, textured loop, level-cut or level-cut/uncut pile texture and maximum pile height of 1/2" per CBC Section 11B-302.2.

C. Carpet edges shall comply with CBC Section 11B-302.2.

2.03 BACKING CHARACTERISTICS:

A. Primary Backing: Non-woven synthetic fiber.

B. Pre-Coat (Fusion Coat): Sealant vinyl.

C. Secondary Backing: Closed-cell, vinyl cushion backing system.

1. Density (ASTM D-1667): 18.5 lbs/cu. ft. +/- 5%.

2. Compression Set (ASTM D-1667): Max 10%.

3. Compression Deflection (ASTM D-1667): Min. 7 psi @ 25%; max. 25 psi @ 25%.

4. Impermeable to moisture and airflow.

5. Provide for a chemically welded seam that is also impermeable to moisture and airflow.

6. 6 foot width roll goods.

D. Adhesive: Low VOC, factory applied dry adhesive applied to baking and cured during manufacturer. Adhesive system shall comply to ADA guidelines, Section 4.5.3.

2.04 PERFORMANCE CHARACTERISTICS:

A. Flooring Radiant Panel: ASTM E-648 / NFPA 253: Class 1 (CRF: 0.45 watts per square centimeter or greater).

B. Federal Flammability: CSC FF 1-70: Passes.

C. Smoke Density: ASTM E-662 / NFPA 258: < 450 Flaming Mode.

D. Electrostatic Propensity: AATCC 134 (Step & Scuff): 1.5 kV or less.

E. Static Coefficient of Friction: ASTM C-1028: Passes ADA Guidelines for Accessible Routes (Minimum 0.60).

F. Delamination of Secondary Backing of Pile Floor Coverings: ASTM D-3936: Minimum 5 lbs.

G. Lightfastness: AATCC 16E: > 4 @ 100 hours.

H. Vetterman Drum: ASTM D-5417: Minimum 3 @ 22,000 cycles.

I. Moisture Barrier: Moisture Penetration by Impact @ 10 psi: No penetration of backing and seam after 10,000 impacts.

J. Air Flow Barrier: Air Permeability of Textile Fabrics: No air flow, 0.0 cubic feet minimum, through backing and seam.

K. Seam Integrity: Seam to remain intact after 50,000 cycles per Phillips Chair Test.

L. VOC Chamber Testing: ASTM D-5116: Carpet inclusive of dry adhesive system shall meet criteria established by the State of Washington Indoor Air Quality Specifications for Carpet and/or Carpet & Rug Institute (CRI) Indoor Air Quality Carpet Testing Program.

2.05 RELATED MATERIALS:

Use following adhesive and seam sealer materials unless other products are specifically recommended and named in carpet manufacturer’s technical data.

A. Leveling Compound: Latex type, Merkote Products “Mer-Ko Underlay L” or Crossfield Products “Dex-O-Tex G-26 Underlayment”. Verify that the compound is compatible with floor adhesive.

B. Reducer Strips: Burke Mercer No. 701 “Imperial Reducer”, and No. 150 “Joiner” at resilient flooring, solid rubber, colors as selected by Architect.

C. Binder Bars: Aluminum tackless binder edging by B&T Metals, Roberts Co., or Trimedge.

2.06 WALK-OFF TILES AT DOORS:

Provide Triad Mat Series Geo Tile, manufactured by Collins & Aikman, rubber reinforced construction, anti-static, solution dyed polypropylene fiber, 1/4" pile height, 24 ounce/square yard face weight, 135 ounce/square yard total weight, size 18” square. Tiles shall have geometric pattern. Provide manufacturer’s recommended pressure sensitive releasable adhesive for installation.

PART 3 – EXECUTION

3.01 INSPECTION:

Inspect concrete floor slabs prior to start of carpet installation and shall report, in writing, all conditions which will adversely affect installation of carpeting. Do not begin carpet installation until all reported conditions are corrected.

3.02 PREPARATION:

Do not start preparation until new concrete floor slabs are at least 90 days old.

A. Arrange for slabs to be tested for dryness and pH as specified in Section 07260, and coordinate remedial work as required to bring slabs to dryness level acceptable to carpet and adhesive manufacturers. Review moisture testing and pH reports and report unsatisfactory conditions.

B. Cleaning and Drying: Clean new and existing concrete floor slabs of all oil, grease, waxes, curing compounds, dust, dirt, debris, paint and other deleterious substances. Use a commercial vacuum cleaner to remove dust and dirt. Damp mop to remove dust that may remain after first vacuuming, allow surface to dry and again vacuum; repeat procedure if necessary to eliminate all dust. Do not use oiled or chemical treated sawdust or any similar product for dust removal.

C. Leveling: Make floor slabs true to level and plane within a tolerance of 1/8” in 10 feet. Test floor areas both ways with a 10-foot straightedge and repair high and low areas exceeding allowable tolerance. Remove high areas by power sanding, stone rubbing or grinding, chipping off and filling with leveling compound, or equivalent method. Fill low areas with leveling compound. Repair and level the surfaces having abrupt changes in plane, such as trowel marks or ridges, whether or not within the allowable tolerance. Again clean areas where repairs are performed.

D. Conditioning of Materials: Carpet shall be conditioned at the site at not less than 65 degrees F and relative humidity between 10 percent and 65 percent for 48 hours prior to installation.

3.03 CARPET INSTALLATION:

A. General: Install carpet in accordance with requirements of CRI 104, except where more stringent requirements are specified herein or recommended by carpet materials manufacturers.

B. Install carpet rolls in each dye lot in the number sequence as furnished by manufacturer. Roll out carpet in one direction and do not reverse direction at any locations. Align carpet with centerline of room or space, and adjust at edges for wall variations.

C. Color Control: Plan dye lot change locations to prevent shading problems and rejection. Use only one dye lot for each area of building unless otherwise approved; if more than one dye lot is used, obtain prior approval of color match between dye lots.

D. Carpet Runs: Install carpet in one-piece lengths between permanent walls unless otherwise approved. Seams are permitted only where shown on the approved layout shop drawings. Install corridor carpet in 1-piece sizes for full length and width, cross seaming only where corridors change direction.

E. Laying and Seaming: Follow the highest quality professional installation procedures outlined by the National Association of Floor Covering Installers and the carpet manufacturer's directions as to workmanship. Cut carpet for seams between tuft rows by methods that prevent damage to tufts or loops, prevent edge ravels, and preserve uniform tuft row alignment and spacing on both sides and across seams. Lay carpet with tuft or loop rows in straight lines both ways, free of offsets, waviness, distortion or misalignment. Cut seam edges straight and square with backing. Trim carpet at walls, columns and penetrations for a compressed fit.

F. Doorways: Extend carpet into doorways without piecing in and seam to the carpet on other side of door under door centerline except where metal thresholds occur; no small filler pieces of carpet will be permitted at doorways.

G. Install carpet tight and flat on sub-floor, well fastened at edges, with a uniform appearance.

H. Seams: Double-cut carpet seams with accurate pattern match. Make cuts serpentine, true and unfrayed. Chemically weld all seams with manufacturers recommended seam sealer as stated in installation instructions. Make sure the seam is fully sealed.

I. Roll with appropriate roller for complete contact of carpet with mill-applied adhesive to sub-floor.

J. Trim carpet neatly at walls and around interruptions.

K. Completed carpet shall be smooth and free of bubbles, puckers and other defects.

L. Binder Bars: Provide bars at all edges of carpet not abutting walls or other construction, securely fastened in placed. Precisely align splices and tightly miter angles.

3.04 PROTECTION:

Use non-staining building paper to protect carpet from damage by subsequent work. Do no use plastic sheeting. Keep traffic off newly installed carpet for 48 hours.

3.05 CLEAN-UP:

As each carpet area is completed, clean up all dirt and debris, remove spots and soiling with proper cleaner, trim off loose threads with sharp scissors and vacuum entire area clean.

3.06 INSTRUCTION:

After all installations are complete, carpet manufacturer's technical representative shall instruct Owner's personnel in maintenance of carpeting. Give instruction at time and location designated by Owner.

3.07 COMPLETED INSTALLATIONS:

Clean and free of loose carpet, defective or apparent seams, scallops, puckers, ripples, distortion or other defects, and matching the quality of the approved sample installation. Carpet installations not complying with these requirements, as determined, will be rejected. Contractor shall remove rejected carpeting and install new conforming carpeting at no additional contract cost.

END OF SECTION

# SECTION 09900

# PAINTING

## PART 1 - GENERAL

### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide and perform painting, complete.

A. Work In This Section: Principal items include:

1. Preparation of surfaces.
2. Painting of new and existing interior surfaces, except as otherwise specified.
3. Painting of new and existing exterior surfaces, except as otherwise specified.

B. Related Work Not In This Section:

1. Shop prime coats and factory finishes.
2. Painting specified as work of other sections.
3. Caulking and sealants.

C. Surfaces Not To Be Painted:

1. Non-ferrous metal work (other than zinc-coated surfaces) and plated metal, unless particular items are specified to be painted.
2. Exterior concrete walls and surfaces.
3. Surfaces concealed in walls and above solid ceilings.
4. Non-metallic walking surfaces unless specifically shown or specified to be painted.
5. Factory finished surfaces.
6. Ceramic tile and plastic surfaces.
7. Resilient flooring and base.
8. Galvanized fencing u.n.o.
9. Galvanized gratings.
10. Surfaces indicated not to be painted.
11. Surfaces specified to be finish painted under other sections.

D. Extent of Painting: All existing normally painted surfaces, whether painted or not as existing, shall be painted or repainted. All new surfaces, normally painted, shall be painted. All surfaces, specifically indicated on drawings, shall be painted. Exteriors of all buildings on campus shall be painted, whether modified under this contract or not.

### 1.02 COMPLIANCE WITH REGULATIONS:

All materials shall comply with the current rules and regulations of the local air quality management district, with the rules regarding volatile organic compounds, and with FDA rules and regulations for dangerous materials in paint.

1.03 SUBMITTALS:

A. List of Paint Materials: Prior to submittal of samples, submit a complete list of proposed paint materials, identifying each material by manufacturer's name, product name and number, including primers, thinners and coloring agents, together with manufacturers' catalog data fully describing each material as to contents, recommended usage, and preparation and application methods. Identify surfaces to receive various paint materials. Do not deviate from approved list.

B. Color Samples: Prior to preparing samples, obtain color and gloss selections and instructions. Using materials from approved list, prepare and submit 8-1/2" by 11" samples of each complete opaque paint finish.

C. Natural or Stain Finish Samples: Prepare samples on 12" squares of the same species and appearance of wood as sued in the work.

D. Job Samples: Apply minimum 100 square foot samples on site, on actual surfaces to be finished with each material, color and gloss in locations as directed. Prime and intermediate coats shall extend one foot beyond finish coat on each sample in at least 2 directions. Obtain approval of each sample prior to proceeding with the work. Leave the samples in place with removable tags until completion of the work. All work shall match approved samples.

E. Certificates: Submit certificate showing that all produces meet the requirements of paragraph "Compliance with Regulations" above.

1.04 JOB CONDITIONS:

A. Protection: Protect all painting while in progress and cover and protect adjoining surfaces and property of others from damage. Exercise care to prevent paint from contacting surfaces not to be painted. During painting of exterior work, cover windows, doors, concrete and other surfaces not to be painted.

B. Examination of Surfaces: Examine surfaces to be painted or finished under this Section and verify satisfactory condition. Unsatisfactory conditions shall be corrected before application of the first coat of paint.

C. Weather Conditions: Apply paint to clean, dry, prepared surfaces. Do not apply exterior paint during rainy, damp, foggy or excessively hot and/or windy weather. Arrange for temporary heat and ventilation for interior painting.

D. Precaution: Place oily rags and waste in self-closing metal containers, removed from site at the end of each day. Do not let rags and waste accumulate.

1.05 EXTRA STOCK:

A. Provide a one gallon container of each paint color and surface texture to Owner at acceptance.

B. Label each container with color, texture and original application locations, in addition to the manufacturer's label.

PART 2 – PRODUCTS

2.01 MATERIALS:

Use the paint products of only one paint manufacturer unless otherwise specified or approved. In any case, primers, intermediate and finish coats in each painting system must all be the products of the same manufacturer, including thinners and coloring agents, except for materials furnished with shop prime coat by other trades. To the maximum extent feasible, factory mix paint materials to correct color, gloss and consistency for application. Dunn-Edwards is a District standard. No substitutions.

A. Specific paint and minimum number of coats shall be as indicated on Tables I through IV at the end of this section.

B. Special finishes specified hereinafter shall be products of one of the named manufacturers in each case.

C. Liquid Paint Preparation Materials:

1. Liquid surface preparation: ESP Easy Surface Preparation, manufactured by The Flood Company, P.O. Box 2535, Hudson, OH 44236 (800) 321-3444.

2. Liquid sander: PASO Liquid Sander, manufactured by Charles Paint Research, Inc., 2401 East 85th Street, Kansas City, MO 64132 (816) 523-7466.

PART 3 – EXECUTION

3.01 WORKMANSHIP:

Apply painting materials in accordance with manufacturer's instructions by brush or roller; spray painting is not allowed without specific approval in each case. Apply each coat at the proper consistency, free of brush or roller marks, sags, runs or other evidence of poor workmanship. Do not lap paint on glass, hardware or other surfaces not to be painted; apply masking as required. Sand between enamel coats.

A. Interior paint materials are zero VOC products. Contractor shall not add solvents, thinners, diluents or other materials to the paint.

3.02 PREPARATION:

Properly prepare surfaces to receive finishes.

A. Exterior Plaster: Fill hairline cracks with Portland cement patching material; report larger cracks for correction. Test and ensure plaster is sufficiently dry to receive the paint finish.

B. Interior Plaster: Fill small cracks with spackle or equal. Report large cracks and unsightly defects for correction. Test plaster to receive oil or alkyd based paint and verify plaster is sufficiently dry.

C. Gypsum Wallboard: Touch-up minor defects with spackle and sand smooth and flush. Report other defects as specified. Verify that skim coat specified in Section 09250 is properly applied. If not, apply one heavy coat of skim coat material specified in Section 09250, over entire surface by brush or roller.

D. Shop Coated Metal: Degrease and clean of foreign matter. Clean and spot paint field connections, welds, soldered joints, burned or abraded portions with same material used in shop coats. After complete hardening, sand entire surfaces for coat to follow.

E. Uncoated Ferrous Metal: Degrease and clean of dirt, rust, mill scale and all other foreign matter using power tool rotary brushes to achieve a clean surface consistent with SSPC-SP3. Remove pits and welding slag, and clean surfaces to bright metal before priming. Apply metal primer not more than three hours after preparation.

F. Galvanized Metal: Eliminate contaminants and stabilize zinc film by solvent wiping or sweep blasting, as appropriate, followed by not less than one coat of wash primer of type specified in Paint Schedule hereafter, to provide suitable surface for finish painting. Allow to dry. Prepare a representative surface, not smaller than 24” square, or 36” by length of section, as applicable, and obtain approval prior to proceeding.

1. Solvent wiping: Remove oil and grease with rags or brushes saturated in trisodium phosphate or similar alkaline detergent. For heavier soil, use MEK, or equivalent proprietary cleaner. Do not use vinegar or acetic acid.

2. Sweep blasting: Use aluminum/magnesium silicate, limestone or other non-metallic blast media to expose pure zinc.

3. Wash primer: Spray apply one coat of specified wash primer after other preparation is complete, to thickness of 0.5 mils. Allow to dry 60 minutes, and apply top coating in not more than 4 hours. If this time is exceeded for any reason, reapply wash primer to applying finish paint.

G. Metal to receive High Performance Coatings: Provide SSPC-SP 6-63 (NACE No. 3), Commercial Blast Cleaning. All oil, grease, dirt, rust scale and foreign matter shall be removed, and all rust, mill scale, and old paint shall be removed except for slight shadows, streaks or discolorations.

H. Enameled Woodwork: Remove handling marks and effects of exposure to moisture with a thorough sanding over all surfaces of the exposed portions, using at least 150 grit or finer sandpaper and thoroughly clean all surfaces before applying sealer. After priming, putty nail holes, cracks or other defects with putty matching color of finish paint. Cover knots and sappy areas with shellac or approved knot sealer. Sand each base coat smooth when dry.

I. Fixtures, Equipment and Hardware Items: Coordinate with the work of other sections, and coordinate removal of fixtures, equipment and hardware as required to perform painting. Items to be removed include, without limitation: signs and graphics; switch and receptacle plates; escutcheons and plates; all surface-mounted equipment; free-standing equipment blocking access; grilles and louvers at ducts opening into finished spaces; and other items as required and directed.

J. Surfaces Not Mentioned: Prepare surfaces according to recommendations of the paint manufacturer and as approved.

K. Liquid Surface Preparation Materials: Use in lieu of sanding where lead exists, and where directed.

L. Moisture Content: Measure moisture at surfaces using an electronic moisture meter. Do not apply finishes unless moisture is below the following maximums:

1. Exterior Plaster and Concrete: 15 percent

2. Interior Plaster and Gypsum Wallboard: 12 percent

3.03 SURFACE PREPARATION, EXISTING EXTERIOR SURFACES:

A. Metal surfaces shall be washed with an approved cleaner, using hydro-blasting equipment to remove all grease, dirt and foreign material, then rinsed with clean water to remove all residue. Care shall be taken to prevent water from entering buildings.

B. Remove checked, cracked, blistered, scaled, loose and alligatored paint on all wood (except doors) and metal surfaces by machine sanding to a smooth solid surface and dust clean. Doors shall be stripped down to original wood surface.

C. After surfaces have been prepared as specified above, checked and cracked portions of wood work shall be smoothed with an approved exterior spackling compound and sanded smooth.

D. Concrete, stucco and plaster surfaces shall be cleaned with an approved cleaner, using hydro-blasting equipment, to remove dirt, loose particles, water base paint, foreign materials, grease and oil, then rinsed with clean water to remove all residue. Efflorescence shall be brushed off and the surface neutralized with a strong solution of muriatic acid and then thoroughly rinsed with clean water. Allow to dry completely.

E. Where the finish plaster coat is loose it shall be removed to a solid surface. Surfaces that are broken, cracked or damaged, and areas where the finish plaster coat has been removed shall be coated with Weld-Crete as manufactured by Larsen Products Corporation or equal, then shall be given a cement plaster finish coat consisting of one part plastic Portland cement to three parts sand to match the existing finish. Cracks shall be “V-ed” out, filled, finished flush with, and of texture to match the adjoining surface.

F. Wood: Remove dust, grit and foreign material from wood surfaces. Sand surfaces and dust clean. Spot coat knots, pitch streaks and sappy sections with pigmented stain sealer. Fill nail holes, cracks and other defects after priming and spot prime repairs when fully cured.

3.04 SURFACE PREPARATION, EXISTING INTERIOR SURFACES:

A. Plaster and metal surfaces shall be washed with a strong solution of trisodium phosphate and water, to remove dirt, grease and other foreign materials, rinsed with clean water, and then sandpapered and dusted off.

B. Casework to be refinished shall be stripped to original surface, sanded smooth and refinished as specified for new surfaces. Refinishing shall include insides of cabinets and drawers.

C. Checked, cracked, blistered, scaled, loose and alligatored paint on all wood and metal surfaces shall have the paint removed down to original unfinished surface, then hand sanded and dusted clean.

D. Stained and varnished, and varnished wood surfaces which are checked, alligatored, cracked, blistered and are indicated to be refinished with stain and varnish, or varnish, or enamel, shall have the existing finish removed down to the original unfinished surface, then hand sanded and dusted clean.

E. Plastered surfaces shall have cracks, holes and imperfections filled with patching plaster properly prepared and applied, finished flush with, and of texture to match, adjoining surface. Neutralize walls showing effect of alkali. Kill water stains with shellac undercoat, or approved equal. Large cracks shall be V-ed out before being filled.

F. Existing painted masonry and concrete surfaces shall be washed with a strong solution of approved cleaner to remove dirt, grease and other foreign materials and then rinsed with clean water.

G. Unpainted masonry and concrete surfaces which are indicated to be painted shall have all traces of alkali removed by washing with a solution compound of dilute muriatic acid. Allow surfaces to dry a minimum of 48 hours prior to painting.

H. Wood: Remove dust, grit and foreign material from wood surfaces. Sand surfaces and dust clean. Spot coat knots, pitch streaks and sappy sections with pigmented stain sealer. Fill nail holes, cracks and other defects after priming and spot prime repairs when fully cured.

1. Existing painted cabinets shall be thoroughly cleaned and deglossed by sanding or other means prior to painting. Patched and bare areas shall be spot primed with same primer as specified for new work.

3.05 COATS:

The number of paint coats specified to be applied are minimum. Apply additional coats if required to obtain complete hiding and approved results. Ensure acceptable paint finishes of

uniform color, free from cloudy or mottled areas and evident thinness on arrises. “Spot” or undercoat surfaces as necessary to produce such results. Tint each coat a slightly different shade of finish color to permit identification. Conform to the approved Samples. Obtain approval of each coat before applying next coat; otherwise, apply an additional coat over entire surface involved at no additional contract cost.

3.06 COLORS:

The numbers given in the following schedule indicate the types of paints required for each surface, identified by their number in white. The actual paint to be applied on each surface shall be the same material in the color or colors as selected, and as approved on submitted samples. Allow for the use of several colors in each room or space, and for doors, frames, dadoes, trim and other items to be finished in different colors.

3.07 DEGREE OF GLOSS:

Degrees of gloss shown on drawings and herein specified are approximate only. The exact degree of glass required for each surface will be determined. Materials shall meet the following requirements for degree of gloss, when tested according to ASTM D523, using Garner Laboratory 60 degree glass meter after 14 days.

| NOMENCLATURE | PERCENTAGE OF GLOSS |
|---|---|
| Suede or eggshell | 25 – 55 |
| Satin or semi-gloss | 55 – 70 |
| Gloss or high gloss | More than 70 |

3.08 MISCELLANEOUS PAINTING:

A. Duct Interiors: Paint with flat black fire-retardant paint to the extent visible through grilles and registers in finished rooms and spaces.

B. Fire Extinguisher and Fire Hose Cabinets: Apply 2 coats of paint finish, inside and out, matching finish and color of adjoining areas, unless otherwise noted or directed.

C. Color Coding: In mechanical and electrical equipment rooms and spaces, paint all ducts, piping, conduit, equipment and machinery, except such items having a complete factory finish, as specified for interior metal, colors as directed. Not more than 8 colors will be required.

D. Weatherstripping and Sound Seals: Paint exposed metal surfaces to match the door frame, whether or not unfinished, furnished with factory prime coat, or factory treated for paint adhesion.

E. Access Doors and Panels: Generally, paint same color as surrounding walls and ceiling.

F. Registers and Grilles: Paint interiors of ducts showing through registers and grilles black. Paint interior surfaces of plenums visible through return air grilles, slotted return

air inlets and other open construction flat black unless otherwise directed. This includes ducts, pipes, fireproofing, conduits, the structure and other construction in plenum areas. Painting shall extend to include all surfaces visible from any angle.

G. Doors: Seal top and bottom edges after cleaning with coat of primer. Where the faces of the doors differ in color finish, finish the edges to match the face visible when the door is open. Coat cutouts for hinges, edges of lockset holes and strikes same as for first coat.

H. Door Trim and Prime Coated Hinges: Paint trim to match door and paint hinges to match frame.

I. Speaker Grilles: Paint to match surrounding surfaces.

J. Miscellaneous: For any items not specifically indicated or specified that require a paint finish, apply 3 coats of paint as directed.

3.09 CLEANING AND TOUCH-UP WORK:

Make a detailed inspection of paint finishes after all painting is completed, remove spatterings of paint from the adjoining surfaces, and make good all damage that my be caused by cleaning operations. Carefully touch-up all abraded, stained or otherwise disfigured painting, as approved, and leave entire painting in first-class condition.

Paint schedules continue on next page.

| TABLE I<br>EXTERIOR PAINTING SCHEDULE (NEW) | |
|---|---|
| **Surface, Coats** | **Dunn-Edwards** |
| **Plaster & Concrete** | |
| 100% Acrylic Emulsion<br><br>First Coat<br>Second Coat<br>Third Coat | <br><br>EFF-STOP ESPR00<br>Evershield EVSH50 S/G<br>Evershield EVSH50 S/G |
| **Concrete Unit Masonry** | |
| (Only Where Indicated)<br><br>First Coat<br>Second Coat<br>Third Coat | <br><br>BLOCFIL SBPR00<br>Evershield EVSH50 S/G<br>Evershield EVSH50 S/G |
| **Ferrous Metal** | |
| First Coat<br>Second Coat<br>Third Coat | Carboguard 890 VOC<br>Carbothane 133 MC S/G<br>Carbothane 133 MC S/G |
| **Galvanized Metal** | |
| Pretreatment<br>First Coat<br>Second Coat<br>Third Coat | SC-ME01-1 KRUD KUTTER<br>Carboline Galoseal<br>Carbothane 133 MC S/G<br>Carbothane 133 MC S/G |

| TABLE II<br>INTERIOR ENAMEL MATERIALS (NEW) - 0 VOC | |
|---|---|
| **Surface, Coats** | **Dunn-Edwards** |
| **Enamel Finish** | |
| Eggshell Latex, walls & Ceilings only<br><br>Semi-Gloss Latex, door & windows | SZRO30 SpartaZero Eggshell<br><br>SZRO50 SpartaZero Semi-Gloss |

| TABLE III<br>INTERIOR PAINTING SCHEDULE (NEW) - 0 VOC | |
|---|---|
| **Surface, Coats** | **Dunn-Edwards** |
| **Gypsum Board, Plaster, and Concrete** | |
| Eggshell enamel finish | |
| First Coat | UGPR00 Ultra Grip Primer |
| Second Coat | SZRO30 SpartaZero Eggshell |
| Third Coat | SZRO30 SpartaZero Eggshell |
| **Gypsum Board, Plaster, and Concrete** | |
| Semi-gloss enamel finish | |
| First Coat | UGPR00 Ultra Grip Primer |
| Second Coat | SZRO50 SpartaZero Semi-Gloss |
| Third Coat | SZRO50 SpartaZero Semi-Gloss |
| **Concrete Unit Masonry** | |
| Eggshell Finish | |
| First Coat | BLOCFIL SBPR00 |
| Second Coat | Evershield EVSH50 S/G |
| Third Coat | Evershield EVSH50 S/G |
| **Acoustic Tile** | |
| First Coat | W615 Acoustikote |
| Second Coat | W615 Acoustikote |
| **Wood, Modified Urethane** | |
| Transparent Finish | |
| Stain | VALSPAR Zenith Stain DEFT |
| Second Coat | W/B Polyurethane DEFT W/B |
| Third Coat | Polyurethane |
| **Ferrous Metal** | |
| First Coat | Carboguard 890 VOC |
| Second Coat | Carbothane 133 MC S/G |
| Third Coat | Carbothane 133 MC S/G |
| **Galvanized Metal** | |
| Pretreatment | SC-ME01-1 KRUD KUTTER |
| First Coat | Carboline Galoseal |
| Second Coat | Carbothane 133 MC S/G |
| Third Coat | Carbothane 133 MC S/G |

| TABLE IV<br>EXTERIOR PAINTING SCHEDULE (EXISTING) | |
|---|---|
| **Surface, Coats** | **Dunn-Edwards** |
| **Plaster & Concrete** | |
| 100% Acrylic Emulsion<br><br>First Coat<br>Second Coat<br>Third Coat | <br><br>EFF-STOP ESPR00<br>Evershield EVSH50 S/G<br>Evershield EVSH50 S/G |
| **Concrete Unit Masonry** | |
| (Only Where Indicated)<br><br>First Coat<br>Second Coat<br>Third Coat | <br><br>BLOCFIL SBPR00<br>Evershield EVSH50 S/G<br>Evershield EVSH50 S/G |
| **Ferrous Metal** | |
| First Coat<br>Second Coat<br>Third Coat | Carboguard 890 VOC<br>Carbothane 133 MC S/G<br>Carbothane 133 MC S/G |
| **Galvanized Metal** | |
| Pretreatment<br>First Coat<br>Second Coat<br>Third Coat | SC-ME01-1 KRUD KUTTER<br>Carboline Galoseal<br>Carbothane 133 MC S/G<br>Carbothane 133 MC S/G |

| TABLE V<br>INTERIOR ENAMEL MATERIALS (EXISTING) - 0 VOC | |
|---|---|
| **Surface, Coats** | **Dunn-Edwards** |
| **Enamel Finish** | |
| Eggshell Latex, walls & Ceilings only<br><br>Semi-Gloss Latex, door & windows | SZRO30 SpartaZero Eggshell<br><br>SZRO50 SpartaZero Semi-Gloss |

**TABLE VI**
**INTERIOR PAINTING SCHEDULE (EXISTING) - 0 VOC**

| Surface, Coats | Dunn-Edwards |
|---|---|
| **Gypsum Board, Plaster, and Concrete** | |
| Eggshell enamel finish | |
| First Coat | UGPR00 Ultra Grip Primer |
| Second Coat | SZRO30 SpartaZero Eggshell |
| Third Coat | SZRO30 SpartaZero Eggshell |
| **Gypsum Board, Plaster, and Concrete** | |
| Semi-gloss enamel finish | |
| First Coat | UGPR00 Ultra Grip Primer |
| Second Coat | SZRO50 SpartaZero Semi-Gloss |
| Third Coat | SZRO50 SpartaZero Semi-Gloss |
| **Concrete Unit Masonry** | |
| Eggshell Finish | |
| **Prepainted Filled Block** | |
| First Coat | UGPR00 Ultra Grip Primer |
| Second Coat | SZRO30 SpartaZero Eggshell |
| Third Coat | SZRO30 SpartaZero Eggshell |
| **Bare Block** | |
| First Coat | SBPR00 Block Fil |
| Second Coat | SZRO30 SpartaZero Eggshell |
| Third Coat | SZRO30 SpartaZero Eggshell |
| **Wood, Modified Urethane** | |
| Transparent Finish | |
| Stain | VALSPAR Zenith Stain Defthane |
| Second Coat | S. Gloss or Gloss Defthane S. |
| Third Coat | Gloss or Gloss |
| **Ferrous Metal** | |
| First Coat | Carboguard 890 VOC |
| Second Coat | Carbothane 133 MC S/G |
| Third Coat | Carbothane 133 MC S/G |
| **Galvanized Metal** | |
| Pretreatment | Supreme Chemical (SC-ME 01-1) |
| First Coat | Carboguard 890 VOC |
| Second Coat | Carbothane 133 MC S/G |
| Third Coat | Carbothane 133 MC S/G |

| **Painted Wood** | |
|---|---|
| First Coat | UGPR00 Ultra Grip Primer W603 |
| Second Coat | SZRO50 SpartaZero Semi-Gloss |
| Third Coat | SZRO50 SpartaZero Semi-Gloss |

END OF SECTION

# SECTION 10155

# SOLID PLASTIC TOILET COMPARTMENTS

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Solid plastic toilet compartments and urinal screens.

B. Related Sections:

1. Division 01: Administrative, procedural, and temporary work requirements.

### 1.2 REFERENCES

A. ASTM International (ASTM):

1. A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

2. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

3. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

### 1.3 SYSTEM DESCRIPTION

A. Compartment Configurations:

1. Toilet partitions: Floor mounted, overhead braced.

2. Urinal screens: Floor mounted.

### 1.4 SUBMITTALS

A. Submittals for Review:

1. Shop Drawings: Include dimensioned layout, elevations, trim, closures, and accessories.

2. Product Data: Manufacturer's descriptive data for panels, hardware, and accessories.

3. Samples: 2 x 3 inch samples in each color.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 10 years experience in manufacture of solid plastic toilet compartments with products in satisfactory use under similar service conditions.

B. Installer Qualifications: Minimum 10 years experience in work of this Section.

1.6 WARRANTIES

A. Provide manufacturer's 25 year warranty against breakage, corrosion, and delamination under normal conditions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Contract Documents are based on products by Scranton Products (Santana-Comtec). (www.scrantonproducts.com)
B. Model: Hiney Hiders.

C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

A. Doors, Panels and Pilasters:

1. High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.

2. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.

3. 1 inch thick with edges rounded to 1/4 inch radius.

4. Fire hazard classification: Class A flame spread/smoke developed rating, tested to ASTM E84.

5. Colors: District Standard.

B. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.

C. Stainless Steel: ASTM A167, Type 304.

2.3 HARDWARE

A. Hinges:

1. Continuous stainless steel, spring loaded.

B. Door Strike and Keeper:

1. 6 inches long, fabricate from heavy-duty extruded aluminum with bright dip anodized finish, with wrap-around flanges secured to pilasters with stainless steel tamper resistant Torx head sex bolts.

2. Bumper: Extruded black vinyl.

C. Latch and Housing:
D.

1. Heavy-duty stainless steel.

2. Slide latch and paddle.

E. Coat Hook/Bumper:
F.

1. Combination type, chrome plated Zamak.

2. Equip outswing handicapped doors with second door pull and door stop.

G. Door Pulls: Chrome plated Zamak.

2.4 COMPONENTS

A. Doors and Dividing Panels: 55 inches high, mounted 14 inches above finished floor.

B. Pilasters: 82 inches high, fastened to pilaster sleeves with stainless steel tamper resistant Torx head sex bolt.

C. Pilaster Sleeves: 3 inches high, 20 gage stainless steel, secured to pilaster with stainless steel tamper resistant Torx head sex bolt.

D. Wall Brackets: 54 inches long, heavy-duty aluminum, bright dip anodized finish, fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.

E. Headrail: Heavy-duty extruded aluminum, anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant Torx head sex bolt and at top of pilaster with stainless steel tamper resistant Torx head screws.

F. Headrail Brackets: 20 gage stainless steel, satin finish, secured to wall with stainless steel tamper resistant Torx head screws.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install compartments in accordance with manufacturer’s instructions and approved Shop Drawings.

B. Install rigid, straight, plumb, and level.

C. Locate bottom edge of doors and panels 14 inches above finished floor.

D. Provide uniform, maximum 3/8 inch vertical clearance at doors.

E. Not Acceptable: Evidence of cutting, drilling, or patching.

3.2 ADJUSTING

A. Adjust doors and latches to operate correctly.

END OF SECTION

# SECTION 13120

# STEEL LUNCH SHELTER
(PC #'s 04-111787)

## Part 1 – GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract.

### 1.2 SUMMARY

A. This Section specifies a pre-engineered, freestanding steel Lunch Shelter consisting in general of concrete footings, steel columns and beams, metal decking, and finish as noted on the drawings. The Lunch Shelter does not require cross bracing in any direction.

B. Design Criteria: The system shall be designed for a 20 psf live load and a 3 psf dead load.
   1. The system shall be designed for a 10'-0" minimum clear height.
   2. Column spacing as shown on plans.
   3. The following references are to be used as a basis for calculations of member size and connections
      a. A.I.S.C Manual of Steel Construction
      b. A.I.S.I Specification for the Design of Cold Rolled Steel Members

C. The owner shall provide all independent testing and inspection.

### 1.3 SUBMITTALS

A. General: Submit the following according to the conditions of the contract and Division-1 Specification Sections.

B. Product Data & Shop Drawings: Submit National Carport Industries DSA-approved plans.

C. Site Plan: Submit site plans for all Lunch Shelters coordinated with field measurements and complete with all dimensional data and other information required for manufacture and installation.

D. Steel Test Reports: Coordinate and provide steel testing as required by DSA. Either of the two acceptable testing methods may be used.

E. Engineering Calculations: Submit complete engineering calculations for all Lunch Shelters. These calculations shall have been made and signed

by a California Licensed Structural Engineer. All Calculations shall conform to DSA IR M-6.

F. Deviations: It will be the responsibility of the owner to furnish National Carport Industries with a list clarifying any deviations from the specifications, written or implied.

1.4 QUALITY ASSURANCE

A. System Manufacturer: Established firm with a minimum of ten (10) years experience in the design and fabrication of DSA approved pre-engineered steel building systems.

B. System Design: Under direct supervision of a professional engineer experienced in the design of pre-engineered steel building systems and in accordance with AISI “Specification for the design, fabrication, and Erection of Structural Steel for Buildings”, and Article 7, Title 21 CCR.

1. For light gauge steel members, comply with AISI “Specification for the Design of Cold-Formed Structural Steel Members.”

C. Certified welders and welding inspectors are not required, as there is no welding required in the fabrication or installation of the system under standard conditions.

D. Installation subcontractor shall be a firm experienced in the installation of Lunch Shelters of similar size and magnitude and approved by the manufacturer.

E. Engineer Qualifications: Professional engineer licensed to practice in the jurisdiction where project is located and experienced in providing engineering services of the type indicated that have resulted in the successful installation of DSA-approved pre-engineered Lunch Shelters.

F. Manufacturer’s Qualifications: Lunch Shelter Manufacturer shall have previously obtained approval from the DSA for the types of Lunch Shelters specified herein, with per-approved structural drawings on file with DSA.

G. Manufacturer’s Product Warranty: Submit manufacturer’s standard warranty form for Lunch Shelter. This warranty form is addition to, and not a limitation of other rights the owner may have under the contract documents.

1. Warranty Period: Manufacturers standard for one (1) year.
2. Beneficiary: Issue warranty in legal name of project owner.
3. Warranty Acceptance: Owner is the sole authority who will determine acceptance of warranty documents.

1.5 PROJECT CONDITIONS

A. Field Measurements: Check actual dimensions of construction affecting Lunch Shelter by accurate field measurement. Coordinate fabrication schedule with construction process to avoid delaying the work.

B. Site Conditions: Upon delivery of the material and arrival of installation sub-contractor, site conditions will be accessed and extra charges signed for if required. Extra charges may include but are not limited to: Saw-cutting of concrete, hard drilling, concrete pumping, spoils removal if not disposable on site, and alternate footing required by site conditions.

C. Owner or Owner's representative will be required to sign a drilling release before work is commenced.

PART 2 – PRODUCTS

2.1 Manufacturer

A. Design Standard: For the purposes of design, DSA-approved Lunch Shelter by National Carport Industries were used.

2.2 Materials

A. Concrete: 3000 psi at 28 days. No batch plant inspection per Section 1929 A.4 through A.5. 5.4 inch slump, Maximum size aggregate 1".

B. Structural Steel Shapes, Plates, and Bars: ASTM A36, except where higher strength steel is indicated or standard with manufacturer.

C. Steel Roof Deck: The steel roof deck shall be fabricated from steel conforming to Section A3 of the latest edition (1996) of the American Iron and Steel Institute Specifications for the Design of Cold Formed Steel Structural Members. The steel used shall have a minimum Yield Strength 0f 33 ksi (230 Mps).

2.3 FINISHES

A. Columns to be unprimed steel as per DSA specification. Columns may be galvanized as an option.
   1. Columns to primed and field painted by others.

B. Beams and roof deck to galvanized by hot dip process conforming to ASTM A.1.23-58A.

C. Painted Galvanized Metal Surface: Apply manufacturers standard baked enamel finish to roof deck and trim.

## PART 3 – EXECUTION

### 1.1 INSPECTION

A. The owner shall provide an IOR (Inspector of Record) for all phases of the installation requiring inspection.

### 1.2 INSTALLATION

A. Erection of the Walkway Covers shall be in accordance with the specifications and plans approved by the DSA.

END OF SECTION

# SECTION 15400

# PLUMBING

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Section 15010, “Basic Mechanical Requirements” applies to the work of this Section.

B. The work listed or required by this section of the specifications is not intended to limit or establish the extent of the Plumbing work. The General Contractor shall be responsible for determining the extent of the Plumbing work to be done under a subcontract.

### 1.02 DESCRIPTION

A. Work Included: The work includes the furnishing of labor, materials, appliances and tools necessary for the installation, in complete working order, of plumbing systems as herein specified and as indicated on the drawings. The item of work shall include, but not be limited to, the following principal items:

1. Fixtures and equipment included in plumbing schedule or as indicated on the drawings.
2. Waste and vent piping system.
3. Natural gas piping system.
4. Storm drain system.
5. Potable hot and cold water, tempered water, reclaimed water and piping systems.
6. Non-potable hot and cold water, tempered water, reclaimed water and piping systems.
7. Sleeves, hangers and seismic bracing for piping systems.
8. Insulation of piping.
9. Testing.
10. Excavation and backfill.
11. Rough-in and final gas and water connections to mechanical equipment.
12. Demolition of fixtures, equipment and piping as shown. Demolished items shall become property of contractor (unless otherwise noted) and disposed of off site by contractor.

B. Other work herein specified and shown on the accompanying drawings including addenda, change order and approved shop drawings.

C. The Contractor shall furnish other tradesmen with drawings and directions necessary to enable them to properly construct their work so that the systems shall be properly interconnected.

D. The Contractor shall be responsible for the correctness of his drawings and instructions and make, at his expense, necessary changes in the completed work of other trades made necessary by errors in his drawings or instructions.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Work designated on drawings to be installed or performed by other sections of the specifications.

B. Finish painting of equipment, piping and ductwork shall be under Division 9 Painting Section, except as noted otherwise.

C. Equipment foundations, curbs, or equipment pads as provided under the Concrete Section or Structural Steel Section. Coordinate exact foundation sizes and elevations, and anchor bolt sizes and locations.

1.04 EQUIPMENT RESTRICTIONS

A. Refer to Section 15010

1.05 SUBMITTALS

A. In addition to the requirements of Section 15010, submittal brochures shall include the following items:

1. Piping Materials:

| | |
|---|---|
| Waste and Vent | Potable Hot and Cold Water |
| Non-potable Cold Water | Tempered Water |
| Natural Gas | Storm Drain |

2. Piping Accessories:

| | |
|---|---|
| Hangers | Dielectric Couplers |
| Hanger Supports | Insulation |
| Hanger Brackets | |

3. Valves:

| | |
|---|---|
| Gate Valves | Check Valves |
| Ball Valves | Gas Regulators |

4. Access Panels

5. Fixtures and Equipment:

| | |
|---|---|
| Water Closets | Kitchen Sinks |
| Urinals | Sinks |
| Lavatories | Drinking Fountains |
| Floor Drains | Trap Primers |

| | |
|---|---|
| Floor Sinks | Overflow Drains |
| Receptor Drain | Roof Receptor |
| Hose Bibbs | |

B. Contractor shall coordinate and provide shop drawings of the following:

1. Dimension drawings for concrete pad, curb and equipment foundations (1/4" scale minimum) including bolt sizes and locations.

2. Steel fabrication drawings for equipment and pipe supports attachments (1/8" scale).

3. Control Wiring Diagrams.

PART 2 - PRODUCTS

2.01 GENERAL

A. Plumbing fixtures, fittings or valves intended to dispense water for human consumption which contain more than 0.25% LEAD are not permitted to be sold or installed anywhere within the State of California. These devices shall be 3rd party listed to ANNEX G of NSF/ANSI 61-2008 or other approved testing standard. Evidence of compliance shall be presented to the Building Inspector prior to final inspection California Health & Safety Code 116875 (AB1963).

2.02 PIPING SYSTEMS

A. Sewer, Waste and Vent Piping, Storm Drain and Overflow Piping:

1. Hub-less cast iron pipe and fitting with stainless steel compression couplings conforming to the requirements of CISPI Standard 301, ASTM A888 or ASTM A74 for all pipe and fittings.

2. Pipe and fittings shall be marked with collective trademark of Cast Iron Soil Pipe Institute.

3. Joints for hub-less pipe and fitting shall conform to the manufacture's installation instructions, CISPI Standard 301 and local code requirements. Hub-less coupling gaskets shall conform to ASTM Standard C-654.

4. All below grade piping shall be polyethylene wrapped.

B. Potable and non-potable Cold, Tempered Water and Hot Water Piping above grade or slab indirect drain piping:

1. ASTM B88, Type "L" seamless hard drawn copper tubing with ASTM B16.22 wrot copper fittings. Joints shall be soldered with lead-free, tin-zinc alloy solder such as Harris Stay-Safe 50. Flanges, bronze solder joint, ANSI 150 lb.

C. Potable and Non-potable Cold Water Piping Below Grade:

1. ASTM B88, Type "K" seamless hard drawn copper tubing with ASTM B16.22 wrot copper fittings. Joints shall be brazed with Sil Fos 7.

D. Natural Gas Piping, above Grade:

1. Pipe:

   a. 1” and under: ASTM A-53, Schedule 40, black steel, butt welded.

   b. 2” to 6” ASTM A-53, Schedule 40, black steel, seamless.

   c. 8” to 12”: ASTM A-53, Schedule 20, black steel, seamless.

2. Fittings:

   a. 2” and under: Screwed: malleable iron, black, 150 lb. unions: Malleable iron, black, ground joint, 250 lb., Grinnel No. 554.

   b. 2-1/2” and over: Welded only, 3 pass, butt welded fittings.

3. Outdoor Protection:

   a. Steel Piping with Rust and Protective Coating:

      1) Apply joint cover kits to pipe after joining to cover, seal, and protect joints.

E. Natural gas piping, exterior (below grade):

1. Polyethylene Pipe: ASTM D3350, ASTM D2513, ASTM 02683 and ASTM 3261, pipe designations PE 2306 and PE 3406, designed for gas distribution.

F. Gas Regulators:

1. Type: Balancing diaphragm type with internal relief valve, strainer, vent and automatic shut off.

2. Capacities: As indicated on the drawings.

3. Manufacturers: “Fisher,” “Reliance, “ or “Rockwell.”

G. Hangers, Supports, Brackets and Plates:

1. Horizontal pipe lines shall be carried by hangers or supports spaced according to the following schedule or supported as required by the Uniform Plumbing Code:

| **Schedule 40 Steel Pipe** | | **Copper Water Pipes** | |
|---|---|---|---|
| **Size** | **Max. Spacing** | **Tube O.D.** | **Max. Spacing** |
| ¾” – 1” | 7’-0” | 1” and less | 6’-0” |
| 1-1/4” – 1-1/2” | 8’-0” | 1-1/2” and up 8’-0” | 1-1/2” and up 8’-0” |
| 2” | 10’-0” | | |
| 2-1/2” | 11’-0” | | |
| 3” | 12’-0” | | |
| 4” | 14’-0” | | |
| 5” | 15’-0” | | |
| 6” | 17’-0” | | |

2. Where two or more lines are run at the same elevation, trapeze hangers constructed of “Unistrut” and rods as herein specified may be used. Provide separate hangers for each branch take-off three feet in length or more. Hangers

shall be set so as to allow the pipe to adjust itself to changes produced by expansion and contraction.

3. Hangers for non-insulated pipelines shall be clevis type “Grinnel” Figure 260 or approved equal. Hangers for insulated pipelines shall be a “Grinnell” Figure 300 or approved equal. Hangers shall be supported on threaded rod hangers of the following sizes:

| **Pipe Size** | **Rod Size** |
|---|---|
| 2” and under | 3/8” rods |
| 2-1/2” and 3” | 1/2” rods |
| 4” | 5/8” rods |
| 5” and 6” | 3/4” rods |

4. Hanger Isolation: Copper piping lines shall have “Semco” Trisolators between the hanger or bracket and the pipe.

5. Supports: Supports for vertical piping shall be “Grinnel” Figure 261 or approved equal split clamps bolted around the pipe and resting on the floor slab.

6. Brackets: Standoff brackets for vertical line of piping and valve assemblies shall be “Secure Strut & Hanger Co.” Figure 7 or approved equal offset pipe clamps.

7. Plates: Where exposed pipes pass through walls, floor and ceilings, they shall be fitted with “Beaton and Caldwell Manufacturing Company” No. 3 – A factory finish split wall plates fastened to the pipe with a set screw. Plates shall be large enough to cover the openings around the pipe.

8. Seismic Bracing: Where hanger rods on horizontal runs of pipe are 24 inches in length or longer, there shall be one 3/16” x 1” steel stay bolted to each pipe hanger clamp and anchored to the wall or ceiling. Stays to ceiling shall rise at a 45 degree angle and be anchored with 5/16” bolts in chinch lead anchors for concrete construction; for steel construction clamp with beam clamps to beams. Alternate stays shall be installed on opposite sides.

H. Identification of Piping: Identify and paint exposed piping, with appropriate color-coding as specified in Section 15010.

2.03 VALVES

A. Provide and install valves required for draining and full control of piping and equipment. Valves shall be one of the following makes for the various conditions and positions required: “NIBCO,” “Stockham” or “Crane”. Valves of one type shall be of one manufacturer.

B. Unless otherwise indicated, valves of types installed in connection with mechanical piping shall comply with the following:

1. Pack stems in conformance to ASTM B16.34.

2. Valves 4” and larger mounted in excess of 7’-0” above the floor in mechanical rooms shall be equipped with chain operators and guides. Extend chains to within 6’-6” of floor.

3. Mark each valve at the factory with the following minimum information, engraved, stamped or cast on each valve or metal tag permanently attached to the valve.

    a. Manufacturer's name.

    b. Catalog or figure number.

    c. Size and pressure class.

    d. Arrows to indicate direction of flow on check, globe, angle, nonreturn and eccentric plug valves.

    e. Underwriter's Laboratories (UL) approved valves shall bear the UL label.

4. Each valve shall be the same size as the pipe in which it is installed.

5. Provide extended valve stem with tee handle on valves installed in insulated piping.

C. Bronze Gate Valves: Provide wedge disc pattern with nonrising stem, repackable under full operating pressure when wide open.

1. Provide valves designed for 125 psig stem and 200 psig non-shock water, oil or gas working pressures.

2. Size 2" and smaller:

    a. Materials: Provide bodies, bonnets and discs made from bronze conforming to ASTM B62. Stems shall be bronze silicon alloy, ASTM B99.

D. Ball Valve, two-piece or one top entry bronze body conventional port with [316 stainless steel] or [brass with hard chrome plated] ball, Teflon seats and stuffing box ring, blowout-proof stem with lever handle.

1. Provide valves designed for 125 psig stem and 400 psig non-shock water, oil or gas.

    a. Size 3" and smaller

        1) a. Two-piece lead free bronze body full port with brass with hard chrome plated ball, PTFE seats and stem seals, adjustable packing nut, blowout-proof stem with lever handle. Basis of design, NIBCO S/T-685-80-LF or equal.

E. Swing Check Valve, bronze body, horizontal swing, Y-pattern with 45º seat regrindable type, with renewable seat and disc.

1. Provide valves designed for 125 psig steam and 200 psig non-shock water, oil or gas.

    a. Size 3" and smaller

        1) Lead free bronze body, horizontal swing, Y-pattern with 45º seat regrindable type, with renewable seat and disc. Basis of design, NIBCO S/T-413-Y-LF or equal.

F. Pressure Reducing Valves: Bronze Body and Bell Housing, nylon reinforced Buna-N diaphragm and renewable stainless steel seat. Wilkins 500 YSBR series, WATTS No. 233S or equal.

G. Backflow Prevention Devices:

1. Manufacturer shall be Wilkins, Cla-Val or equal.

2. Reduced Pressure Principle Type: Cast Iron Body with spring loaded, diaphragm assisted main check valve, a spring loaded second check valve and a spring loaded diaphram actuated differential pressure relief valve, body rated for 175 psi working pressure complete with two full port resilient wedge gate valves and four resilient seated ball valve test cocks. Stainless steel and bronze corrosion resistant internal parts and replaceable seats.

3. Arrange for and pay fees for testing and certification of backflow prevention devices by a firm or agency approved by the Owner's Representative.

H. Relief Valves:

1. Potable Water Temperature and Pressure: On hot water storage tanks provide an American Society of Mechanical Engineers (ASME) rated McDonald Miller, Watts Regulator Co., or equal, thermostatic, self-closing temperature and pressure relief valve, located in the relief valve openings of tanks. Valve shall have a minimum thermal discharge capacity equal to the input capacity of the heater, standard pressure setting of 125 psig and standard temperature setting of 210ºF. Route discharge pipe to service sink.

2.04 WATER HAMMER ARRESTORS

A. Stainless steel housing and bellows designed specifically to cushion surges in water supply piping due to sudden on-off operation of valves. Sizes are recommended by Plumbing and Drainage Institute Standard PDI WH-201. Manufacturer: "J.R. Smith" Hydrotol, "Greer" Surge Kushon, or "Wade" shockstops.

B. Provide access door for arrestors located in the plumbing chases.

2.05 INSULATION:

A. General: Pipe thickness shall conform to Title 24 as a minimum. Use thickness specified, if greater than Title 24 requirements.

B. Pipe Insulation

1. Manufacturers: Johns Manville Corporation or approved equal.

2. Glass Fiber: Johns Manville Micro-Lok meeting ASTM C547; rigid molded, non-combustible.

a. 'K' (ksi) Value: 0.23 at 75ºF.

b. Maximum service temperature: 850ºF.

c. Vapor Retarder Jacket: AP-T Plus white kraft paper reinforced with glass fiber yarn and bonded to aluminum foil, secure with self sealing longitudinal

laps and butt strips or AP jacket with outward cinch expanding staples or vapor barrier mastic as needed.

3. Elastomeric Foam: Rubatex R-180-FS/R-1800-FS meeting ASTM C534; flexible, cellular elastomeric, molded or sheet.

   a. 'K' (ksi) Value: 0.28 at 75ºF.

   b. Maximum Service Temperature: 220ºF.

   c. Maximum Flame Spread: 25.

   d. Maximum Smoke Developed: 50 (for 3/4" thick and below); 100 (for above 3/4" thick).

   e. Connection: Water vapor retarder adhesive as needed; Rubatex R-373 adhesive.

   f. UV-Protection: Outdoor protective coating; Rubatex 374 coating.

4. Field Applied Jackets:

   a. Aluminum Jacket: 0.016 inch thick sheet, (smooth/embossed) finish with longitudinal slip joints and 2 inch laps, die shaped fitting covers with zz factory attached protective liner.

C. Equipment Insulation:

1. Manufacturers: Johns Manville Corporation or approved equal.

2. Flexible Fiber Glass Blanket: Manville 812 Spin-Glass meeting ASTM C612; flexible.

   a. 'K' (ksi) Value: 0.24 at 75ºF.

   b. Maximum Service Temperature: 450ºF.

   c. Density: 1.5 lb./cu. ft. density.

   d. Vapor Retarder Jacket: Aluminum foil reinforced with fiber glass yarn and laminated to fire-resistant kraft, secured with UL listed pressure sensitive tape and/or outward clinch expanding staples and vapor barrier mastic as needed.

3. Rigid Fiberglas Board: Manville 814 Spin-Glas meeting ASTM C612; rigid, noncombustible.

   a. 'K' (ksi) Value: 0.23 at 75ºF.

   b. Maximum Service Temperature: 850ºF.

   c. Density: 3.0 lb./cu. ft.

d. Vapor Retarder Jacket: Aluminum foil reinforced with fiber glass yarn and laminated to fire resistant kraft, secured with UL listed pressure sensitive tape and/or outward clinch expanding staples and vapor barrier mastic as needed.

e. Facing: 1 inch galvanized hexagonal wire mesh stitched on one face of insulation.

4. Rigid Fiber Glass Board: Manville 1000 Spin-Glas meeting ASTM C612; rigid, noncombustible.

   a. 'K' (ksi) Value: 0.23 at 75°F.

   b. Maximum Service Temperature: 850°F.

   c. Density: 3.0 lb/cu ft.

   d. Facing: 1 inch galvanized hexagonal wire mesh stitched on one face of insulation.

5. Cellular Glas: ASTM C552; 'K' Value of 0.35 at 75ºF; 8.0 lb./cu. ft. density.

6. Elastomeric Foam: Rubatex R-180-FS/R-1800-FS meeting ASTM C534; flexible, cellular elastomeric, molded or sheet.

   a. 'K' (ksi) Value: 0.28 at 75ºF.

   b. Maximum Service Temperature: 220ºF.

   c. Maximum Flame Spread: 25.

   d. Maximum Smoke Developed: 50 (for 3/4" thick and below); 100 (for above 3/4" thick).

   e. Connection: Water vapor retarder adhesive as needed; Rubatex R-373 adhesive.

   f. UV-Protection: Outdoor protective coating; Rubatex 374 coating.

7. Apply insulation as close as possible to equipment by grooving, scoring and beveling insulation, if necessary. As required, secure insulation to equipment with studs, pins, clips, adhesive, wires or bands.

8. Fill joints, cracks, seams and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retardant cement.

9. Provide insulated dual temperature equipment or cold equipment containing fluids below ambient temperature with vapor retardant jackets.

10. For insulated equipment contained fluids above ambient temperature, provide jacket with or without vapor barrier.

11. Cover insulation with metal mesh and finish with heavy coat of insulating cement, mastic or aluminum jacket as indicated in the drawings.

12. For equipment in mechanical equipment rooms or in finished spaces, finish with Manville Zeston 2000 jacketing and fitting covers or aluminum jacketing.

13. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.

14. When equipment with insulation requires periodic opening for maintenance, repair or cleaning, install insulation in such a manner that it can be easily removed and replaced without damage.

D. Piping Insulation Schedule:

1. Insulate waste lines receiving cold condensate same as roof drainage to first branch receiving waste.

| | Description | Pipe Size Inch | Thickness Inch |
|---|---|---|---|
| 1. | Flexible Fiber Glass Insulation | up to 2 inch | 1 |
| | Domestic Hot 70ºF to 200ºF | 2 inch to 4 inch | 1-1/2 |
| | Cold Water | all sizes | 1 |
| | Roof Drain Bodies | all sizes | 1 |
| | Roof Drainage within 10 ft (3 meters) of the exterior | all sizes | 1-1/2 |
| | Plumbing Vents within 10 ft. all sizes (3 meters) of the exterior | all sizes | 1 |
| 2. | Elastomeric Foam | | |
| | Domestic Hot 70ºF to 200ºF | up to 2 inch | 1 |

E. Equipment Insulation Schedule:

| | Description | Thickness Inch |
|---|---|---|
| 1. | Flexible Fiber Glass Blanket | |
| | Heat Exchangers/Converters | 1-1/2 |
| | Air Separators | 1 |
| 2. | Rigid Fiber Glass Board | |
| | Domestic Hot Water Storage Tanks | 2 |

2.06 Fixtures

A. Plumbing fixtures shall be by the manufacturers listed below. Make type and Model Number for fixtures are shown on drawing schedules.

1. For water closets – American Standard; Floor mounted; Madera (students), Cadet (staff); elongated; ADA.

2. For lavatories – American Standard; Wall hung; Lucerne #0335.012; ADA compliant and standard; concealed arm supports.

3. For urinals – American Standard #6501.01; ADA compliant.

4. For service sinks – American Standard, Kohler or Crane.

5. For Classroom Sink – Haws #4230; Stainless Steel; ADA compliant.

6. Faucets, valves, and supports

    a. Water closet flush valves – Sloan Royal Flushometer #111; Low consumption.

    b. Urinal Flush Valves – Sloan Royal Flushometer #186-1.0; Low consumption.

    c. Water Closet Fixture Support – Jay R. Smith; No hub; 0210Y Series.

    d. Lavatory Fixture Support – Jay R. Smith; Wall mounted with concealed arms; #700-D.

    e. Classroom Sink Faucet – Chicago Gooseneck #350-E35CP; Cold water, only, except at designated locations; ADA compliant.

    f. Classroom Sink Bubbler – Chicago #748-665CP; ADA compliant.

    g. Faucet/Bubbler: Chicago #748-665CP; ADA compliant.

    h. Lavatory faucets – American Standard, Kohler, Crane, Sloan or Delany.

    i. Service sink faucet – American Standard, Kohler or Crane.

    j. Toilet seats – Church, Olsonite or Beneke.

    k. Eyewash – Guardian #G1849; ADA compliant mounting height.

7. For waterless urinals – Falcon #F-4000.

8. Stainless Steel Sinks – Elkay or Just

    a. Sink Faucet – Elkay or Just

9. Electric Water Coolers – Haws, Sunroc or Halsey – Taylor.

10. Floor Sinks, Roof Drains, Overflow Drains, Roof Receptor and Air Gap Fittings – J.R. Smith, Josam or Zurn.

11. Floor Drain – Jay R. Smith; Restroom and exterior deck locations.

12. Hose Bibbs – Acorn, Woodford.

13. Trap primers – Precision Plumbing Products or approved equal.

B. Water Heater (See Water Heater Schedule on Drawing)

1. Chronomite - Instant electric; Instant-Flow; Low flow rate (0.5 GPM); Factory pre-set temperature at 100 degrees F.; Verify voltage in the field.

C. Expansion Tank (See Expansion Tank Schedule)

1. Shall be pre-pressurized diaphragm tube for portable hot water systems, Therm-X-Trol, as manufactured by “Amtrol” or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. Inspect the architectural, structural, fire protection, special system and HVAC drawings and specifications to become familiar with the type of building construction and to coordinate with the work of others.

2. Apparatus, fixtures, devices and appliances which require pipe connections shall be so equipped and each such pipe connection shall be valved or trapped, or provided with special apparatus as indicated on the drawings or elsewhere specified. Where such connections are not indicated on the drawings or specified they shall be made in the usual manner recommended by the manufacturer of each such equipment.

B. Piping:

1. Install in a manner that permits expansion and contraction caused by changes in water temperature and pressure. Provide additional supports as required. Run pipes straight and true, parallel to or at right angles to the building walls. Springing or forcing piping into place will not be permitted.

2. Reduced fittings shall be used in lieu of bushings. Close nipples will not be permitted.

3. Pipe lines shall be installed in the locations and of the sizes shown on the drawings or specified herein and of the material and workmanship herein specified and shall be free from stain, tool, marks or other foreign substances.

4. Exposed piping in the building shall be installed parallel to or at right angles to the building walls. Pipe lines shall be installed free from traps and air pockets and true to line and grade. Horizontal lines shall be installed as close to the building construction as possible so as to leave the greatest possible head room under them.

5. The only filler that may be used in making up screw joints in pipe lines shall be an approved graphite paste or Teflon tape.

6. Copper tube water lines shall be fitted with drop ear elbows securely anchored to the building framing at each fixture supply stub-out.

7. Where pipes of two dissimilar metals are joined, “Mallory” dielectric couplings or approved equal shall be installed.

8. Saw cut or core drill existing slabs or walls to install pipes, equipment or fixtures.

9. Where valves are not accessible from utility or furred spaces, the Contractor shall furnish and install “Access Panels.”

10. Where screw and valves are used in threaded pipe lines there shall be a union installed in the pipe as close to the valve as possible. At soldered pipe lines an I.P.S. to copper adaptor shall be installed on both sides of valve screw end.

11. Valves of pipe lines of each service shall be tagged with the valve discs or nameplates as specified hereinafter, except where the use is obvious or where the apparatus controlled is visible from the valve.

12. Valves other than relief valves and air vent valves shall be the same size as the pipe lines in which they are installed. Valves shall be packed with an approved brand or graphited valve stem packing.

C. Fixtures and Equipment:

1. Install in strict accordance with manufacturer's written installation instructions and recommendations. Fixtures shall be roughed in only from fixture manufacturer's certified "Rough-In" Measurement Drawings, which shall be submitted to the Architect for approval.

D. Water Hammer Arrestors: Install at end of fixture headers with two or more fixtures or at each fixture, which may create surges during normal operation. Install in the upright position as close as possible to valve or valves being served. Provide 12" x 12" brushed stainless steel access door with locking cover.

E. Backflow protection devices of code approved type and shall be provided and installed where required by code.

3.02 INSULATION

A. Verify that surfaces are clean, dry and free of foreign material.

B. Install materials in accordance with manufacturer's recommendations, building codes and industry standards.

C. Continue insulation vapor barrier through penetrations except where prohibited by code.

D. Piping Insulation:

1. Locate insulation and cover seams in least visible locations.

2. Neatly finish insulation at supports, protrusions and interruptions.

3. Provide insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature with vapor retardant jackets with self sealing laps. Insulate complete system.

4. For insulated pipes conveying fluids above ambient temperature, secure jackets with self sealing lap or outward clinched, expanded staples. Bevel and seal ends of insulation at equipment, flanges and unions.

5. Provide insert between support shield and piping on piping 1-1/2 inches diameter or larger. Fabricate heavy density insulating material suitable for temperature. Insulation inserts shall not be less than the following lengths:

| | |
|---|---|
| 1-1/2” to 2-1/2” pipe size | 10” long |
| 3” to 6” pipe size | 12” long |
| 8” to 10” pipe size | 16” long |
| 12” and over | 22” long |

6. For pipe exposed in mechanical equipment rooms or in finished spaces below 10 feet above finished floor, finish with aluminum jacket.

7. For exterior applications, provide weather protection jacket or coating. Insulated pipe, fittings, joints and valves shall be covered with aluminum jacket. Jacket seams shall be located on bottom side of horizontal piping.

3.03 SEISMIC REQUIREMENTS

A. Equipment and piping shall be provided with seismic restraint devices to limit movement. See Section 15010 and provide in accordance with SMACNA “Seismic Restraint Manual” guidelines for Mechanical Systems.

3.04 PIPE CLEANING AND DISINFECTION FOR POTABLE WATER PIPING

A. Pipe cleaning and disinfection applied to hot and cold potable water systems and shall be performed after pipes, valves, fixtures, and other components of the systems are installed, tested and ready fro operation.

B. Potable water piping shall be thoroughly flushed with clean potable water prior to disinfection to remove dirt and other contaminants. Screens to faucets shall be removed before flushing and reinstalled after completion of disinfection.

C. Disinfection shall be done using either chlorine gas or liquid chlorine. Calcium or sodium hypochlorite may be used as approved in AWWA C601 procedures.

D. A service cock shall be provided and located at the water service entrance. The disinfecting agent shall be injected into the system from this cock only.

E. The disinfecting agent shall be injected by a proportioning pump or device through the service cock slowly and continuously at an even rate. During disinfection, backflow of disinfecting agent into main water supply is not permitted.

F. Sectional valves must be operated during disinfection. Outlets must be fully opened at least twice during injection and the residual checked with orthotolin solution.

G. When the chlorine residual concentration, calculated on the volume of water the piping will contain, indicated not less than 50 Parts Per Million (PPM) at outlets, then valves must be closed and secured.

H. The residual chlorine shall be retained in the piping systems for a period of not less than 24 hours.

I. After the retention, the residual shall be not less than 5 PPM. If less, then the process shall be repeated as described above.

J. If satisfactory, then fixtures shall be flushed with clean potable water until residual chlorine by ortholine tests shall be not greater than the incoming water supply (this may be zero).

K. Work and certification of performance shall be performed by approved applicators or qualified personnel with chemical and laboratory experience.

1. Certification of performance shall indicate:

a. Name and location of the job and date when disinfection was performed.

b. Material used for disinfection.

c. Retention period of disinfectant in piping system.

d. PPM chlorine during retention.

e. PPM chlorine after flushing.

f. Statement that disinfection was performed as specified.

g. Signature and address of company/person performing disinfection.

L. Upon completion of final flushing (after retention period), the Contractor shall obtain one water sample from hot water system and one from the cold water system and submit samples to a State approved laboratory. Results from laboratory shall be provided to Architect and shall indicate:

1. Name and address of approved laboratory testing the samples.

2. Name and location of job and date the samples were obtained.

3. The coliform organism count. An acceptable test shall show absence of coliform organisms.

M. If analysis does not satisfy the above minimum requirements, the disinfection procedure must be repeated.

N. Before acceptance of the systems, the Contractor shall submit to the Architect for his review, three copies of Laboratory Report and three

O. Under no circumstances shall the Contractor permit the use of potable water systems until properly disinfected, flushed and certified.

3.05 TESTS

A. Drainage piping shall be tested and proved tight under 10 feet of water pressure prior to replacing ceilings.

B. Water piping and pumped drain or forced main piping shall be purged of air and tested and proved tight under 125 PSI hydrostatic pressure for a period of not less than two hours.

C. Gas piping shall be tested with air and proved tight under 60 psi for a period of not less than two hours.

3.06 CLEANING

A. Equipment, piping, etc., shall be thoroughly cleaned so as to remove rust, scale, plaster, or internal obstructions before a covering is installed or piping or equipment is painted. No scarring or disfiguring of equipment, piping, etc. will be acceptable before covering or painting is applied.

B. Parts of the work which are to be painted or which are exposed in the finished work shall be thoroughly cleaned and made ready to receive paint finish.

C. The exposed parts of equipment shall be cleaned, oil and grease removed, and the bright parts left clean and polished.

D. Upon completion of the work, remove rubbish, debris and surplus materials, resulting there from, the premises together with his instruments, and equipment and shall leave the site in a neat, clean and acceptable condition as approved by the Architect.

## 3.07 PRELIMINARY OPERATIONS

A. Should the Owner require that a portion of the systems or equipment be operated prior to the final completion and acceptance of the work, the Contractor shall furnish such operation. The expense thereof will be paid by the Owner, separate and distinct from money paid on account of the contract.

B. Such preliminary operation or testing, payment shall not be construed as final acceptance of the work of this contract.

## 3.08 EXCAVATION AND BACKFILL

A. Comply with the requirements for trenching, backfilling and compaction as specified in Division 2.

END OF SECTION

# SECTION 15500

# HEATING, VENTILATION AND AIR CONDITIONING

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Section 15010, “Basic Mechanical Requirements” applies to the work of this Section.

B. The work listed or required by this section of the specifications is not intended to limit or establish the extent of the Heating, Ventilating and Air Conditioning work. The General Contractor shall be responsible for determining the extent of work to be done under a subcontract.

### 1.02 DESCRIPTION

A. Work included: Provide labor, materials, appliances and tools necessary for the installation of the systems as herein specified and indicated on the drawings. The items of work shall include, but shall not be limited to, the following principal items:

1. Equipment including, package air conditioning units, duct free fan coil units, air cooled condensing units, exhaust fans, ventilators, etc.

2. Air distribution system, including ductwork, diffusers, registers, dampers, terminal units, etc.

3. New clean filters for air handling units prior to tests.

4. Insulation for ductwork and piping.

5. Refrigerant Piping and Fitting.

6. Condensate drain piping from fan coil units and air conditioning units to the drain receptors.

7. Exhaust systems including fans, drives, ductwork, registers, etc.

8. Miscellaneous hangers, supports, sleeves, inserts, isolators, flexible connections, seismic bracings, and other auxiliary equipment for systems under this section.

9. Equipment identification, operations and maintenance instructions.

10. Testing, adjustment and balancing of air systems.

11. Duct leak test of air systems, not to exceed 1% of each system.

12. Measurement and recording of final operating condition of HVAC Systems.

13. Sound measurement of equipment operating conditions.

14. Vibration measurement of equipment operation conditions.

B. Apparatus, piping, ductwork, etc. shall be installed and interconnected so as to form complete systems.

C. One four-hour day of instructional time to Owner's maintenance of personnel by Contractor's start-up mechanic.

D. Other work herein specified and shown on the accompanying drawings, including addendum, change orders and approved shop drawings.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Work designated on drawings to be installed or performed by other sections of the specifications.

B. Motor starters and disconnects shall be furnished and installed under Division 16 of the specifications, unless otherwise specified or shown.

C. Finish painting of equipment, piping and ductwork, except as noted otherwise.

D. Equipment foundations, curbs, equipment pads, sumps and pits. Coordinate exact foundation sizes and elevations and anchor bolt sizes and locations.

E. Air intake and discharge louvers in the building's exterior walls.

1.04 EQUIPMENT RESTRICTIONS

A. Names of selected manufacturers have been specified for items of equipment and materials. Bids shall be based on the use of the product of one of the selected manufacturers, and only such products may be submitted for approval.

1.05 SUBMITTALS

A. In addition to the requirements of Section 15010, the submittal brochures shall include the following items:

1. Air Distribution System:

| | |
|---|---|
| Duct Sealer | Diffusers |
| Flexible Connections | Registers |
| Flexible Duct | Fire Dampers |
| Balancing Dampers | Duct Access Doors |
| Duct Turns | Combination Smoke/Fire Dampers |
| Spin-In Fittings | Smoke Detectors |

2. Piping System

Refrigerant Piping
Condensate Drain Piping
Pipe Hangers and Supports

3. Insulation:

Ductwork:
Interior
Exterior

Plenums
Ductliner
Equipment

4. Accessories:

| | |
|---|---|
| Pressure Gauges: | Thermometers: |
| Air | Air |

5. Equipment:

| | |
|---|---|
| Package Air Conditioning Units | Duct Free Fan Coil Units |
| Air Cooled Condensing Units | Exhaust Fans |
| Filters | Ventilator |

6. Shop Drawings:

   a. Shop drawings shall be 1/4” scale minimum.

   b. Dimension Drawings for concrete pad, curb and equipment foundation (1/4” scale minimum) including bolt sizes and locations.

   c. Seismic Shop Drawings

      1) Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations. (1/4” scale minimum).

      2) Provide details of suspension and support for ceiling hung equipment.

      3) Where walls, floors, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers’ submittals must include spacing, static loads and seismic loads at attachment and support points.

      4) Provide details of seismic restraints and anchors; include number, size and locations for each piece of equipment.

   d. Provide calculations (including the combining of tensile and shear loadings) to support seismic restraint design.

      1) Testing and calculations must include both shear and tensile loads as well as one test or analysis at 45º to the weakest mode. Analysis must indicate calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameters, embedment and/or welded length. Seismic restraint devices shall be designed to accept, without failure, the forces acting through the equipment center of gravity. Overturning moments may exceed forces at ground level.

      2) Provide calculations to determine strain loads resulting from seismic forces presented in CMC and CBC, governing codes, and project seismic

requirements. Seismic calculations shall be certified by a licensed engineer experienced in the design of restraints.

3) Seismic restraint calculations must be provided for connections of equipment to the structure. Calculations must be stamped by a registered professional engineer with at least five years of seismic design experience, licensed in the state of the job location.

e. Provide complete scale (1/4" minimum) duct fabrication drawings for duct systems and equipment to be installed on this project to the Architect for approval prior to fabrication and installation.

1) Duct offsets, transitions, sizes, routing and appurtenances shall be included in the scale drawings. Duct system installed locations shall be coordinated with Divisions of work included in this project prior to installation.

2) The Mechanical Engineers Contract drawings shall not be used as the duct fabrication drawings. Drawings submitted in this format will be rejected and returned not reviewed to the contractor for re-submittal.

f. The submittal drawings shall include one reproducible tracing, and six sets of prints. The original tracing shall be returned to the contractor with comments and approvals as noted.

7. Certified Report

a. Air Conditioning Units

8. Air Balance Report Forms:

a. Submit reports on AABC National Standards for Total System Balance.

1.06 VIBRATION ISOLATION AND SEISMIC RESTRAINT

A. Mechanical equipment, piping and ductwork shall be mounted on vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonable uniform deflections.

B. Isolators shall have integral seismic restraints and be selected for minimum static deflection of 1 inch or as otherwise noted and in accordance with the equipment manufacturer's weight distribution so as to produce reasonable uniform deflection. Vibration isolators shall be a system by a manufacturer as listed by the Office of Statewide Health Planning Development (OSHPD); with an anchorage pre-approval OPA-number.

C. Isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.

D. Provide housekeeping pads 4" minimum height for equipment. See Structural Specification.

E. It is the intent of the seismic portion of this specification to keep mechanical building system components in place during a seismic event. Such systems must be

installed in strict accordance with seismic codes, component manufacturers and building construction standards. Whenever a conflict occurs between the manufacturers, codes or construction standards, the most stringent shall apply.

F. This specification is to be a minimum requirement for seismic consideration and is not intended as a substitute for legislated, more stringent, national, state or local construction requirements (i.e., California Title 24) or other requirements.

G. A variance or noncompliance with these specification requirements shall be corrected by the Contractor in an approved manner.

## PART 2 - PRODUCTS

### 2.01 VIBRATION ISOLATORS

A. Vibration isolators and seismic restraints described in this section shall be the product of a single manufacturer. M.W. Sausse's products are the basis of these specifications; products of other manufacturers are acceptable provided their systems comply with the specification and have the approval of the Architect.

B. Spring isolators shall be free standing and laterally stable without a housing and complete with a mode neoprene cup or 1/4" neoprene acoustical friction pad between the baseplate and the support. Mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated loads. Springs shall have a minimum additional travel to a solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflection, compressed spring height and loading spring height. Mountings shall be type SLF as manufactured by Mason Industries, Inc.

C. Restrained spring mounting shall have an SLF mounting as described above within a rigid housing that includes vertical limit stops to prevent spring extension when weight is removed. The housing shall serve as blocking during erection. A steel spacer shall be removed after adjustment. Installed and operating heights are equal. A minimum clearance of 1/2" shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring action. Limit stops shall be out of contact during normal operation. Since housing will be bolted or welded in position there must be an internal isolation pad. Housing shall be designed to resist seismic forces. Mountings shall have anchorage pre-approval "OPA" number from OSHPD in the State of California certifying the maximum certified horizontal and vertical load ratings. Mounting shall be SLR as manufactured by Mason Industries, Inc.

D. Spring mounting shall be SFL as specified above as in specification five built into a ductile iron or steel housing to provide all-directional seismic snubbing. The snubber shall be adjustable vertically and allow a maximum of 1/4 inch travel in each direction before contacting the resilient snubbing callers. Mountings shall have an anchorage pre-approval "OPA" number from OSHPD in the State of California verifying the maximum certified horizontal and vertical load ratings.

E. Seismic Code Restraints shall consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint. Cable end connections shall be steel assemblies that swivel for a final installation angle and utilized two clamping bolts to provide proper cable

engagement. Cables must not be allowed to bend across sharp edges. Cable assemblies shall have an anchorage pre-approval “OPA” number from OSHPD in the State of California verifying the maximum certified load ratings.

F. Curb mounted rooftop equipment shall be mounted on spring isolation curbs. The lower member shall consist of a sheet metal Z section containing adjustable and removable steel springs that support the upper floating section. The upper frame must provide continuous support for the equipment and must be captive so as to resiliently resist wind and seismic forces. All-directional neoprene snubber bushings shall be a minimum of 1/4” thick. Steel springs shall be laterally stable and rest on 1/4” thick neoprene acoustical pads. Hardware must be plated and the springs provided with a rust resistant finish. The curbs waterproofing shall consist of a continuous galvanized flexible counter flashing nailed over the lower curbs, waterproofing and joined at the corners of EPDM bellows. Spring locations shall have access ports with removable waterproof covers. Lower curbs shall have provision for 2” of insulation. The roof curbs shall be built to seismically contain the rooftop unit. The unit must be solidly fastened to the top floating rail and the lower Z section anchored to the roof structure. The curb shall have anchorage pre-approval “OPA” from OSHPD in the State of California attesting to the maximum certified horizontal and vertical load ratings.

## 2.02 DUCTWORK MATERIALS

A. General:

1. Ductwork shown on the drawings unless otherwise indicated or specified shall be constructed of zinc-coated steel.

2. Galvanized steel sheets (Min. 24 gage) shall be first quality cold rolled, galvanized, open hearth soft steel sheets, capable of double seaming without fracture, meeting ASTM A525-87.

3. Aluminum sheets shall meet requirements of ASTM B209, 2, 1.4 mil finish.

4. Steel shapes shall be hot rolled, galvanized.

5. Screws and bolts shall be cadmium plated.

6. Materials and fabrication shall be incompliance with California Code of Regulations as a minimum.

B. Materials, Application:

1. Pressure: Unless otherwise indicated, ductwork shall be constructed for 2” pressure class. Materials and construction shall be in accordance with tables listed in SMACNA HVAC Duct Construction Standards and California Code of Regulations (Title 24, Part 4). The most stringent of the SMACNA Standards or the California Code of Regulations, shall be applicable.

2. Ducts shall be sealed to SMACNA seal class “A”, UL 555 [and shall be Division of the State Architect approved]. No duct tape shall be permitted.

3. Transverse joints in rectangular ducts may be manufactured type similar to Ductmate Industries, Inc.

C. Circular Ducts:

1. Circular (cross section) sheets shall be galvanized steel of spiral seam construction.

2. Joints between two ducts shall be made with beaded sleeve joint having duct sealer applied to joint. Mechanically fasten joints with sheet metal screws or pop rivets.

3. The radius of elbows shall be minimum of 150% of the diameter or maximum width of duct. Gored elbows are not acceptable.

4. The fittings shall be of conical type change in shape from round to rectangular mode with transformation joint with minimum of 1 to 7 taper.

5. Corrugated or flexible metal duct circular ducts will not be acceptable.

D. Access Doors:

1. Non-walk-in access doors in rectangular sheet metal ducts shall conform to SMACNA Duct Construction Standards, Fig. 2-10, plus accompanying description, except that the following shall be provided:

a. Use #140 “Ventlok”, “Duro-Dyne” or equal latch for access doors in ductwork too small to permit entrance of a man. Hinges: Use two hinges on doors where the hinged edge is under 24”, three hinges on doors where the hinged edge is 24” and over. Doors under 14” x 14” size shall be No. 24 gauge with piano hinge and edge stiffeners.

b. Access Door Thickness: Doors shall be double thickness. Provide full thickness of insulation inside door panels in insulated ducts.

c. Gasketing: The door shall have a compressible gasket seal of incombustible material.

d. Dimensions: Minimum 12” X 12” in furred spaces and 18” X 18” in equipment rooms.

2. Non-walk-in access doors for circular ducts shall conform to SMACNA Duct Construction Standards, Figure 2-13 and accompanying description, except other items shall be the same as for rectangular ducts.

E. Insulated Flexible Ductwork and Branch Takeoff:

1. General:

a. Insulated flexible ductwork shall be a factory fabricated assembly composed of a coated spring steel wire spiral helix permanently bounded to a CPE interior liner, and supporting a fiberglass insulating blanket with a fiberglass scrim vapor barrier. Working pressure: Plus 6” W.G. minimum.

b. Length of flex ducts shall be 6’-0” maximum. Suspend at maximum 3’-0” O.C. with 1-1/2” wide galvanized sheet metal straps. The location of flex duct shall be installed between the branch ducts to the diffusers, grilles and registers.

c. Manufacturer: Ductwork shall be “Thermaflex” Model G-KM. Other acceptable manufacturers are “Wiremold”, “Genflex”, “Glass-Flex” or approved equal.

d. Ductwork shall have precut lengths with continuous inner liner.

e. Round duct takeoffs from main ducts shall be provided with “Spin-In” or “Twist-Lok” fittings and a factory installed manual balancing damper assembly complete with a level position indicator and a positive locking device.

2. The flexible duct shall be listed in accordance with U 181, Class 1 flexible air duct requirements and comply with NFPA 90A and 90B with a flame and smoke spread rating not in excess of 25/50.

3. Installation must conform with [Los Angeles City Code and] factory supplied and UL approved printed installation instruction sheets.

4. Submittals are required to include product data sheets and installation instruction sheets in order to assure awareness of the proper installation technique.

5. Insulation must achieve a minimal thermal conductance (c) rating of 0.23 and must be completely shielded from the airstream.

F. Dampers: Products of “Pottorff”, “Ruskin”, “Ventlok”, or “Airstream” are acceptable.

1. Manual volume dampers in ducts up to 48” in width shall conform to SMACNA Duct Construction Standards Fig. 2-12 or 2-13 plus its accompanying description except that the following shall be provided:

a. Gauge and rod size: The gauge of leaf shall be equal to that of duct in which damper is located, except that it shall never be less than 22 gauge. Fasten damper leaves to square rods using damper blade clips. Use a 3/8” square rod for leaves up to 18” long and 1/2” square rod for leaves 19” to 48” long. Damper leaves shall not exceed 8” in width. Use multiple leaves when required.

b. For accessible locations in low pressure ducts, provide each leaf with No. 607 “Ventlok” end bearing and a No. 640 or No. 641 “Ventlok” self-locking regulator or approved equal by “Young Regulator” or “Duro-Dyne”.

c. For inaccessible locations above the ceiling, provide opposed blade volume damper with frame conforming to SMACNA Duct Construction Standards Figure 2-15 and accompanying description, plus No. 680 “Ventlok” miter gears, No. 666 or No. 667 concealed damper regulator and universal joints as required or approved equal by “Young Regulator” or Pottorff No. RCS210. Concealed regulator cover plate shall be suitable for field painting. When a single leaf of 8” is used, use two end bearings of type previously described, in lieu of a frame.

d. Steel parts shall be galvanized.

e. For insulated ductwork, the operator arm shall be set on an extension bracket flush with the outside of the insulation. Notch damper rod ends to indicate position of installed damper blades.

f. Dampers shall be stiffened where necessary to prevent noise. A damper causing noise shall be replaced by new ones or additional stiffeners added so as to eliminate the noise. Individual damper blades shall not exceed eight inches (8") wide by length required.

g. Volume dampers above new or existing suspended ceilings shall be marked by attaching a bright yellow, 12" length strip of cloth attached to damper rods.

h. Products of "Pottorff", "Ruskin", "Ventlok", or "Airstream" are acceptable.

2. Manual Volume Dampers over 48" are to be sectioned horizontally and constructed as specified previously.

3. Back draft Dampers: Back draft dampers shall be low-leakage type with aluminum blades with neoprene seals mounted in a 16-gauge minimum steel frame. Bearings shall be oil-impregnated bronze, Teflon or nylon of the sleeve type. The steel frame shall be a factory finished with a mill galvanized finish.

   a. Manufacturer shall be Pottorff series 60 Model BD64 or approved equal by Ruskin or C & S.

4. CFSD (Combination Fire/Smoke Damper)

   a. CFSD shall be designed and constructed in accordance with NFPA Standard 90A, 92A, UL555S and Division of the State Architect (DSA) requirements. Provide permanent identification with DSA listing number.

   b. Manufacturer's approved installation instructions shall be shipped with each CFSD.

   c. Rating 1-1/2 hour fire-resistive rating.

   d. Provide access doors in ducts on each CFSD.

   e. Damper shall also close and mechanically lock upon signals from smoke detector or loss of power. Each damper assembly shall be provided with a Pottorff PI-50 indicator switch package having two blade position indicator switches to indicate the status of the dampers as to full open or full closed and Pottorff Model RCP-1 remote command station to reset CFSD.

   f. Smoke/ Fire Closure "Motor w/ Bimetal Links" Combination fire and smoke dampers will be louver bladed type. Dampers must be tested and listed under both UL 555 and UL 555S. Units must be factory supplied assemblies that consist of damper, sleeve and 1 cycle/year actuator. Dampers must have a minimum class II leakage and dynamic closure rating under UL 555S. Provide units as power-open unless otherwise noted. Actuators to have a minimum operating temperature of 350º F. Seals should be metal to metal without the use of synthetic gasket. Dual temperature thermal switches (DRS-30) rated for 212º F and 350º F, unless otherwise noted. Install in accordance with manufacturer's installation instructions provided with units. Provide suitable access for inspection and servicing of each damper. Provide integrated CSFM listed duct smoke detector model 2151 or DH-100 AC/DC except in the city of LA.

g. Motor actuators must be by ISO 9000 recognized control manufacturer and certified by ETL laboratories for 1 year continuous power applications such. Stall motors will not be accepted. Dual temperature thermal switches shall be equipped with auxiliary contacts for remote annunciation. Pottorff Model FSD 142. (CSFM No. 3225-0368: 110 & 3230 – 368: 111) or approved equal.

h. Manufacturer:

1) Square or rectangular duct type shall be “Pottorff” FSD Model FSD-142. Other acceptable manufacturers are “Ruskin”, “C & S” or approved equal.

2) Round duct type shall be “Pottorff” FSD Model FSD-125r. Other acceptable manufacturers are “Ruskin”, “C & S” or approved equal.

5. Locations: The drawings attempt to give reasonable indications of the locations and size of CFSD and fire dampers. Each location shall be determined by reference to the Architectural and Structural drawings and by actual measurements at the building, and shall comply with California Building Code [and Division of State Architects] requirements. Since ductwork layouts may vary, the responsibility for location of dampers at each duct penetration through a fire rated wall, slab or ceiling rests with the Contractor at no additional cost to the Contract. The final arrangement

G. Door Grilles

1. Krueger Series 600 and 600A V-shaped louvers of 20 gage steel, one inch (25 mm) deep on 1/2 inch (13 mm) centers.

2. Provide 20 gage steel frame with auxiliary frame to give finished appearance on both sides of door, with factory prime coat finish.

H. Louvers

1. Provide 4 inch louvers with blades on 45 degree slope [with center baffle and return bend], heavy channel frame, birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake.

2. Fabricate of 16 gage galvanized steel, welded assembly, with factory baked enamel finish.

3. Furnish with exterior flat flange for installation.

I. Flexible Connections: Provide where called for on drawings, and at the ducted discharge and inlet of every fan.

1. At least 12” wide flexible connections with 1” to 4” slack in ventilating and air conditioning systems located indoors shall be Vent fabrics Ventfab waterproof and fire retardant canvas, “Duro-Dyne” or equal.

J. Duct Sealer: Shall be Tuff Bond No. 12, “Duro-Dyne” S-2 “Spec Seal” or approved equal. Duct tape is unacceptable.

## 2.03 MOTORIZED DAMPERS

A. Dampers shall be ultra-low-leakage (damper leakage shall be no more than 3 CFM per square foot at 1" W.C. differential pressure), opposed blade type. Frame: Extruded aluminum hat channel, minimum 0.125" thick. Blades: Extruded aluminum airfoil shape with extruded vinyl edge seals. Jamb seals and linkage: Stainless steel type.

B. Each damper section shall have an operator rod for connection to a damper motor linkage. Provide a bearing and bracket to support the free end of each damper section operator rod. Provide concealed linkage hardware for blades in a section.

C. Provide a maximum of six inches wide steel damper blades with replaceable vinyl end seal inserts.

D. Provide 5" by 1" by 16 gauge "hat channel" formed galvanized steel section frames with reinforcing stabilizers and corner bracing for structural rigidity.

E. Provide stainless steel sleeve bearings with molded hexagonal synthetic inserts, ½" plated steel hex angles, 1/8 x ½ inch plated steel concealed linkage and stainless steel closure stops. Drive axles shall protrude at least 6" from the side of the frame. Provide outboard shaft support bearings for single section dampers driven by crankarms.

F. With blade lengths of 30" or less, single damper section heights can be extended to 60" maximum.

G. Configure large damper sections horizontally utilizing a single 1" OD steel pipe jack shaft with ball bearing support brackets at each section header. Link each end of the driven damper blade to the jack shaft with ball and pivot hardware. Attachments to the blade shall be bolted via hardware, which cannot pull out of the blade.

H. Driven damper blades (one each section) shall drive other blades in the section via end linkages. Provide concealed blade linkages at each end of the damper blades in each section so that blades will receive symmetrical drive force.

I. Design based on "Ruskin" Model CD-50. Equal products by "Air Balance Co.", "Pacific Air Products" or "Pottorff" may be submitted for approval.

J. Notch damper rod ends to indicate position of damper blades. Seal around damper frame and duct walls.

## 2.04 DIRECT-COUPLED ELECTRONIC ACTUATOR

A. Damper and valve actuation shall be accomplished using "Belimo" electric/electronic control actuators.

B. Provide Belimo direct-coupled actuators mounted directly to the damper shaft or valve gear train without the need for connecting crankarm linkage. The fastening clamp shall use a "V" shaped, toothed cradle to attach to the control shaft with two bolts for maximum holding strength. Single bolt or set screw type fasteners are not acceptable.

C. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator or motor throughout its rotational arc, even if stalled. The end switches to deactivate the actuator motor at the ends of rotation or magnetic clutches are not acceptable.

D. Proportional actuators shall accept a 2-10 VDC or 4-20 DC signal and shall provide a 2-10 VDC position feedback signal.

E. 24 VAC/DC actuators shall not require more than 12 VA on AC powered applications or eight watts on DC powered applications.

F. Provide an external manual gar release button to aid in an initial travel calibration and to permit manual positioning when the actuator is not powered.

G. Provide an external switch to change direction of rotation to establish proper actuator response to control signal.

H. Provide spring return actuators where shown, called our or required, capable of both clockwise or counterclockwise spring return operation by changing the mounting orientation.

I. For power failure/safety applications, a mechanical spring returning mechanism shall be used. Non-mechanical forms of fail-safe operation are not acceptable, except for a central emergency power backup source.

J. Provide “Form C” end-switch kits where required to signal the status of either or both travel limits.

K. Provide each actuator with a factory installed three conductor electrical cable inside a BX type sheath with conduit fitting on the end to make an easy connection to an electrical junction box.

L. The actuators shall be listed with Underwriters Laboratories under Standard 873. They must be manufactured in an ISO 9001 certified plant.

M. Actuators shall have a two year manufacturer’s warranty starting from the date of acceptance by the Owner.

2.05 SPIN-IN FITTINGS

A. For round duct takeoff from a rectangular duct shall be constructed of galvanized steel complete with angled, scoop extractor and spring loaded locking quadrant butterfly damper. Damper shall be a factory installed with spring loaded retractable bearing. Mounting groove shall be a die formed. Install using duct sealer at tap-in to a main duct. Submit for approval.

2.06 DUCT SUPPORTS

A. Duct hangers, spacing of hangers, upper and lower attachments, etc. shall conform to the most stringent requirements of the SMACNA or Uniform Mechanical Code. See Part 3.0 for seismic requirements.

B. Provide additional supports for upper attachments for ductwork utilizing a secondary steel support system consisting of roll-formed channel, “Unistrut” Series P-1002 (back-to-back 1-5/8” X 0.010”) roll formed channels) members securely attached between support beams or purlins in accordance with structural engineers approval. Attach duct mounting straps to steel channels using “Unistrut” type spring-loaded, matching nuts and bolts. Furnish additional “Unistrut” channel, clamps, brackets, etc., for complete support of ductwork and diffusers. Do not penetrate a metal duct with fasteners.

2.07 CONDENSATE DRAIN PIPING

A. ASTM B88, Type “L” hard drawn, seamless copper tubing with ANSI B16.22 wroth copper fittings. Joints shall be solder sweat type. Solder shall be lead nickel-bearing and antimony free such as “Harris” Bridget.

2.08 CLASSES AND MAXIMUM WORKING PRESSURE

A. Except as specified otherwise, piping components shall be suitable for use under the maximum working pressures indicated. Excepted as modified herein, the pressure temperature limitations shall be as specified in the referenced standards and specifications. Pressures in this specification are pressures in pounds per square inch (psi) above atmospheric pressure and temperatures in degrees Farenheit (ºF).

2.09 REFRIGERANT PIPING

A. Copper Tubing: ASTM B280, Type ACR hard drawn.

B. Fittings: ANSI/ASME B16.22 wrot copper.

C. Joints: ANSI/ASTM B32, solder Grade 95TA.

2.10 FLEXIBLE PIPING CONNECTORS

A. Provide “Resistoflex” Model R6904, Mason Safeflex single sphere SFEJ standard for pipe size 1-1/2” to 24” and Safeflex for pipe size 3/4” to 1-1/4” or approved equal at each air handling unit coil connection, pump connections, and piping connections to chillers and equipment.

2.11 INSULATION

A. General: Pipe fittings and valves and duct thickness shall conform to Title 24 as a minimum. Use thickness specified, if greater than Title 24 requirements. Insulation to have a flame spread of not more than 25 and a smoke density not exceeding 50 when tested as a composite.

B. Pipe Insulations

1. Manufacturers: Johns Manville Corporation or approved equal.

2. Elastomeric Foam: ASTM C534; flexible, cellular elastomeric, molded or sheet.

a. ‘k’ (ksi) Value: 0.28 at 75ºF.

b. Maximum Service Temperature: 220ºF.

c. Maximum Flame Spread: 25.

d. Maximum Smoke Developed: 50 (3/4” thick and below) 100 (above 3/4” thick).

e. Connection: Water vapor retarder adhesive as needed; Rubatex R-373 adhesive.

f. UV-Protection: Outdoor protective coating; Rubatex 374 Coating.

3. Field Applied Jackets:

a. Aluminum Jacket: 0.016 inches thick sheet, [smooth/embossed] finish with longitudinal slip joints and 2 inches laps, die shaped fitting covers with factory attached protective liner.

C. Equipment Insulation

1. Manufacturers: Johns Manville Corporation or approved equal.

2. Flexible Fiber Glass Blanket: 812 Spin-Glas meeting ASTM C533; flexible.

a. 'k' (ksi) Value: 0.24 at 75ºF.

b. Maximum Service Temperature: 450ºF.

c. Density: 1.5 lb./cu ft density.

d. Vapor Retarder Jacket: Aluminum foil reinforced with fiberglass yarn and laminated to fire-resistant kraft, paper secured with UL listed pressure sensitive tape and/or outward clinch expanding staples and vapor barrier mastic as needed.

3. Rigid Fiber Glass Board: 814 Spin-Glas meeting ASTM C612, rigid.

a. 'k' (ksi) value: 0.23 at 75ºF.

b. Maximum Service Temperature: 450ºF.

c. Density 3.0 lb./cu ft density.

d. Vapor Retarder Jacket: Aluminum foil reinforced with fiberglass yarn and laminated to fire resistant kraft, secured with UL listed pressure sensitive tape and/or outward clinch expanding staples and vapor barrier mastic as needed.

e. Facing: 1 inch galvanized hexagonal wire mesh stitched on one face of insulation.

4. Rigid Fiber Glass Board: 1000 Spin-Glas meeting ASTM C612, rigid noncombustible.

a. 'k' (ksi) Value: 0.23 at 75ºF.

b. Maximum Service Temperature: 850ºF.

c. Density: 3.0 lb./cu ft.

d. Facing: 1 inch galvanized hexagonal wire mesh stitched on one face of insulation.

D. Ductwork Insulation

1. Manufacturers: Johns Manville Corporation or approved equal.

2. Flexible Fiber Glass Blanket: Microlite Type 75 meeting ASTM C553, flexible blanket.

    a. 'k' (ksi) Value: 0.27 at 75ºF [0.040 at 24ºC] installed.

    b. Density: 0.75 lb./cu ft [12 kg/cu m].

    c. Vapor Barrier Jacket: FSK, aluminum foil reinforced with fiberglass yarn and laminated to fire-resistant kraft, paper secured with UL listed pressure sensitive tape and/or outward clinched expanded staples and vapor barrier mastic as needed.

3. Ducts Located Outdoor:

    a. Aluminum Jackets: 0.016 inches [0.045 mm] thick sheet, smooth/embossed finish, with longitudinal slip joints and 2 inches [55 mm] laps.

    b. Johns Manville Insulate ET, a non-water vapor retarder, nonburning, weatherproof coating for use over insulation where "breathing" is required.

    c. Johns Manville Zeston 2000 jacketing, UV resistant polyvinyl chloride covering with joints secured and sealed with Johns Manville Perma-Weld Adhesive.

    d. Galvanized Jackets: 24 Gage.

4. Rectangular Duct Liner: Permacote Linacoustic meeting ASTM C1071 with air surface coated with acrylic coating treated with EPA registered anti-microbial agent proven to resist microbial growth as determined by ASTM G 21 and G 22.

    a. 'k" (ksi) value: ASTM C 518, 0.25 at 75 degrees F.

    b. Noise Reduction Coefficient: .70 or higher based on "Type A mounting" and tested in accordance to ASTM C423.

    c. Maximum Velocity: 5,000 ft/min.

    d. Adhesive: Meeting ASTM C 916.

    e. Fasteners: Duct Liner galvanized steel pins, welded or mechanically fastened.

5. Round Duct Liner: Permacote Spiracoustic, rigid preformed round liner, or Spiracoustic Plus with air surface coated with acrylic coating treated with EPA register anti-microbial agent proven to resist microbial growth as determined by ASTM G21 and G22.

    a. 'k' (ksi) Value: ASTM C 518, 0.23 at 75 degrees F.

    b. Noise Reduction Coefficient of .70 as per ASTM C 423. (Type A mounting).

    c. Maximum Velocity: 5,000 ft/min.

E. Pipe Insulation Schedule:

1. Elastomeric Foam

| Service | Pipe Size (Inch) | Thickness (Inch) |
|---|---|---|
| a. Refrigerant Suction Line | All Sizes | 1 |
| b. Refrigerant Hot Gas Line | All Sizes | 3/4 |
| c. Run Outs (12' Max. Length) | Up to 2 | 1 |

F. Ductwork Insulation Schedule:

1. Flexible Fiber Glass

| Service | Thickness (Inch) | Finish |
|---|---|---|
| a. Exhaust Ducts within 10 ft of Exterior Opening | 1-1/2 | FSK |
| b. Exhaust Ducts Exposed to Outdoor Air Ventilation | 1-1/2 | FSK |
| c. Air Ventilation Equipment Casings | 1-1/2 | FSK |
| d. Supply Ducts (Cooling Systems) | 1-1/2 | FSK |
| e. Return Ducts in Unconditioned Spaces and in Ceiling Space | 1-1/2 | FSK |

2. Duct Liner

| Service | Thickness (Inch) | Finish |
|---|---|---|
| 1. Where indicated | 1 | Linacoustic or Permacote |
| 2. 20'-0" minimum from fan coil or air handling unit intake and discharge | 1 | Linacoustic or Permacote |

G. Condensate Drain Piping: Insulate condensate drain piping located inside the building from air cooling coil to drain receptors same as the chilled water piping except use 1-inch thick insulation.

H. Duct and pipe insulation located outside shall be 1" thicker than shown in Schedule.

2.12 DIFFUSERS, REGISTERS, AND GRILLES

A. General: Manufacturer and model numbers shown are to indicate the type and quality of the product desired. Approved equal products by "Krueger".

B. Submittals: Submit one sample of each type, tagged for identification to the Architect for approval. Install one of each type and obtain written approval from Architect prior to ordering.

C. Diffusers (Lay-In Ceiling) Louvered face 3-cone with nominal 24" x 24" perforated panel for mounting in 2' x 2' lay-in tee grid ceiling suspension system. Steel construction. Size as indicated on the drawings. Provide a round neck adaptor.

D. Diffusers (Hard Ceiling): Louvered face 3-cone with beveled frame panel for surface mounting. Steel construction. Size as indicated on the drawings. Provide a round neck adaptor. For hard ceilings, provide ceiling diffusers of neck size.

E. Ceiling Return and Exhaust Air Registers: Louvered face type of steel construction, single deflection. The frame shall be nominal 24” x 24” for mounting in 2’ x 2’ lay-in tee grid ceiling suspension system. Provide a round neck adaptor. For hard ceilings, provide return and exhaust air registers of neck size.

F. Transfer Air Registers: Louvered face type with an airfoil shaped bars at zero deflection spaced on 1/2-inch centers, steel construction. The frame shall be nominal 24” x 24” for mounting in 2’-0” x 2’-0” lay-in tee grid ceiling suspension system. For hard ceilings, provide transfer air registers of neck size.

G. Sidewall Supply Registers: Louvered face type of steel construction, double deflection. Provide opposed blade damper.

H. Sidewall Return and Exhaust Registers/return and exhaust registers in exposed ductwork: Louvered face type of steel construction, single deflection.

I. Painting: Sheet metal duct collars or plenum boxes for the diffuses and registers shall be painted black prior installation of the diffuser and register. Unless otherwise noted, diffusers and registers shall be furnished with off-white baked enamel finish. After balancing and testing, the Contractor shall refinish damaged spots and screw heads.

## 2.13 SMOKE DETECTORS

A. Refer to Division 16 for the specification of duct smoke detectors.

## 2.14 ACCESSORIES

A. Equipment Labels: See Section 15010. In addition, major equipment (i.e., package air conditioning units, DX fan & coil Units, air cooled condensing units, exhaust fans, etc.) shall have equipment symbol number neatly spray-paint stenciled in 4-inch high letters in a position easily visible. Equipment above ceilings not accessible shall have stenciled identification on both sides.

B. Name Tags:

1. Provide engraved bakelite name tags with 3/16” high white letters on black for thermostats, humidistat, switches, control panels, indicating air handling unit and zone numbers. Also provide nametags for air handling unit filter differential pressure gauges as noted below.

2. Install zone damper operations with 1-1/2” high-stenciled letters to match zone thermostat designations. Mount damper operator labels so they are readable from the floor. Both surfaces shall be clean.

C. Instrument Test Holes: Test holes shall be “Vent fabric” Model 699-2 or approved equal by Durodyne or Young Regulator. Provide test holes as needed in both horizontal and vertical positions at the following locations:

1. Supply air ducts at each air conditioning and fan & coil units.

2. Return air duct at each air conditioning and fan & coil units.

3. Fresh air duct at each air conditioning and fan & coil units.

4. Exhaust air duct at each exhaust fan.

D. Filter Pressure Gauges (for air conditioning and fan & coil units Units):

1. Gauges shall be “Dwyer” Magnahelic Series2000, range 0-20” w.g., diaphragm actuated, 3-7/8” diameter dial face, and zero pointer adjustment. Furnish complete with two static pressure tips, fittings for 1/4” metal tubing, and mounting kit.

2. Provide a differential pressure gauge at each air handling unit filter bank with separate gauges to read pressure drop across each type of filter. Mount gauges at eye level with brackets attached to air handling unit. Provide engraved “Name Tag” for “Filter” as specified above.

## 2.15 PACKAGE AIR CONDITIONING UNIT I, GAS HEATING/ ELECTRIC COOLING

A. General:

1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic scroll compressor(s) for cooling duty and gas combustion for heating duty.

2. Factory assembled, single-piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start-up.

3. Unit shall use environmentally sound, R410A refrigerant.

4. Unit shall be installed in accordance with the manufacturer’s instructions.

B. Quality Assurance:

1. Unit meets ASHRAE 90.1-2007 minimum efficiency requirements.

2. Unit shall be rated in accordance with AHRI Standards 210/240 and 340/360.

3. Unit shall be designed to conform to ASHRAE 15, 2001.

4. Unit shall be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL-listed and certified under Canadian standards as a total package for safety requirements.

5. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation

6. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117.

7. Unit casing shall be capable of withstanding Federal Test Method Standard No. 141 (Method 6061) 5000-hour salt spray.

8. Unit shall be designed in accordance with ISO 9001:2008, and shall be manufactured in a facility registered by ISO 9001:2008.

9. Unit shall be designed in accordance with UL Standard 1995, including tested to withstand rain.

10. Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.

C. Unit Cabinet:

1. Unit cabinet shall be constructed of G90 galvanized steel with exterior surfaces coated with a non-chalking, powder paint finish, certified at 1000 hour salt spray test per ASTM-B117 standards. Indoor blower sections shall be insulated with up to 1" thick insulation coated on the airside. Aluminum foil faced insulation shall be used in the unit's compartments and be fastened to prevent insulation from entering the air stream. Cabinet doors shall be hinged with toolless access for easy servicing and maintenance. Full perimeter base rails shall be provided to assure reliable transit of equipment, overhead rigging, fork truck access and proper sealing on roof curb applications. Disposable 2" filters shall be furnished and be accessible through hinged access door. Fan performance measuring ports shall be provided on the outside of the cabinet to allow accurate air measurements of evaporator fan performance without removing panels or creating bypass of the coils. Condensate pan shall be slide out design, constructed of a non corrosive material, internally sloped and conforming to ASHRAE 62-89 standards. Condensate connection shall be a minimum of ¾" I.D. female and be rigid mount connection.

D. Indoor (Evaporator) Fan Assembly:

1. Fan shall be a belt drive assembly and include an adjustable pitch motor pulley. Job site selected brake horsepower shall not exceed the motors nameplate horsepower rating plus the service factor. Units shall be designed to operate within the service factor. Fan wheel shall be double inlet type with forward curve blades, dynamically balanced to operate smoothly throughout the entire range of operation. Airflow design shall be constant volume. Bearings shall be sealed and permanently lubricated for longer life and no maintenance. Entire blower assembly and motor shall be slide out design.

E. Outdoor (Condenser) Fan Assembly

1. The outdoor fans shall be of the direct drive type, discharge air vertically, have aluminum blades riveted to corrosion resistant steel spider brackets and shall be dynamically balanced for smooth operation. The outdoor fan motors shall have permanently lubricated bearings internally protected against overload conditions and staged independently. A cleaning window shall be provided on two sides of the units for coil cleaning.

F. Refrigerant Components:

1. Compressors:

a. Shall be fully hermetic type, direct drive, internally protected with internal high-pressure relief and over temperature protection. The hermetic motor

shall be suction gas cooled and have a voltage range of + or – 10% of the unit nameplate voltage.

b. Shall have internal spring isolation and sound muffling to minimize vibration and noise, and be externally isolated on a dedicated, independent mounting.

2. Coils:

a. Evaporator and Condenser coils shall have aluminum plate fins mechanically bonded to seamless internally enhanced copper tubes with all joints brazed. Special Phenolic coating shall be available as a factory option.

b. Evaporator coils shall be of the direct expansion, draw-thru design.

c. Condenser coils shall have aluminum plate fins mechanically bonded to seamless internally enhanced copper tubes with all joints brazed or Micro-Channel aluminum tube, aluminum fins.

d. Condenser coils shall be of the draw-thru design.

3. Refrigerant Circuit and Refrigerant Safety Components:

a. Independent fixed-orifice or thermally operated expansion devices.

b. Solid core filter drier/strainer to eliminate any moisture or foreign matter.

c. Accessible service gage connections on both suction and liquid lines to charge, evacuate, and measure refrigerant pressure during any necessary servicing or troubleshooting, without losing charge.

d. The unit shall have two independent refrigerant circuits, equally split in 50% capacity increments.

4. Unit Controls:

a. Unit shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-volt transformer side.

b. Unit shall incorporate a lockout circuit which provides reset capability at the space thermostat or base unit should any of the following standard safety devices trip and shut off compressor:

1) Loss-of-charge/Low-pressure switch.

2) High-pressure switch.

3) Freeze-protection thermostat, evaporator coil. If any of the above safety devices trip, an LED (light-emitting diode) indicator shall flash a diagnostic code that indicates which safety switch has tripped.

4) Unit shall incorporate “AUTO RESET” compressor over temperature, over current protection.

c. Unit shall operate with conventional thermostat designs and have a low voltage terminal strip for easy hook-up.

d. Unit control board shall have on-board diagnostics and fault code display.

e. Standard controls shall include anti-short cycle and low voltage protection, and permit cooling operation down to 0 ºF.

f. Control board shall monitor each refrigerant safety switch independently.

g. Control board shall retain last 5 fault codes in non-volatile memory, which will not be lost in the event of a power loss.

G. Gas Heating Section:

1. Heat exchanger and exhaust system shall be constructed of aluminized steel and shall be designed with induced draft combustion with post purge logic, energy saving direct spark ignition, and redundant main gas valve. The heat exchanger shall be of the tubular type, constructed of T1-40 aluminized steel for corrosion resistance and allowing minimum mixed air entering temperature of 40 ºF. Burners shall be of the in-shot type, constructed of aluminum-coated steel. All gas piping shall enter the unit cabinet at a single location, through either the side or bottom, without any field modifications. An integrated control board shall provide timed control of evaporator fan functioning and burner ignition. Heating section shall be provided with the following minimum protection:

a. Low $NO_x$ Heat Exchanger.

b. Primary and auxiliary high-temperature limit switches.

c. Induced draft motor speed sensor.

d. Flame roll out switch.

e. Flame proving controls.

f. Flame proving controls. Unit shall have two independent stages of capacity (60% 1$^{st}$ stage, 100% 2$^{nd}$ stage).

H. Unit Operating Characteristics:

1. Unit shall be capable of starting and running at 125 ºF outdoor temperature, exceeding maximum load criteria of ARI Standard 340/360. The compressor, with standard controls, shall be capable of operation down to 0 ºF outdoor temperature. Unit shall be provided with fan time delay to prevent cold air delivery before heat exchanger warms up.

I. Electrical Requirement:

1. All unit power wiring shall enter unit cabinet at a single factory provided location and be capable of side or bottom entry to minimize roof penetrations and avoid unit field modifications. Separate side and bottom openings shall be provided for the control wiring.

2. Unit shall have the GFCI Type convenience outlet.

3. All unit power wiring shall enter unit cabinet at a single, factory-prepared, knockout location.

J. Modulating Centrifugal Power Exhaust for Down Discharged Units:

1. Provide and install a modulating centrifugal power exhaust to control a neutral pressure in the space. Pressure sensor shall be installed in the space.

K. Economizer:

1. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air.

L. Filter Section:

1. Filters shall be held in place by a pivoting filter tray, facilitating easy removal and installation.

2. Shall consist of factory-installed, low velocity, 2-in. thick filters.

3. Filters shall be standard, commercially available sizes.

M. Unit shall be provided with full perimeter, galvanized steel spring isolator roof curb.

N. “Automated Logic”, Direct Digital Control thermostat.

O. Manufacturer: “York” or “Carrier”.

## 2.16 PACKAGE AIR CONDITIONING UNIT II, GAS HEATING ELECTRIC COOLING

A. General:

1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic scroll compressor(s) for cooling duty and gas combustion for heating duty.

2. Factory assembled, single-piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start-up.

3. Unit shall use environmentally sound, R410A refrigerant.

4. Unit shall be installed in accordance with the manufacturer’s instructions.

B. Quality Assurance:

1. Unit meets ASHRAE 90.1-2007 minimum efficiency requirements.

2. Unit shall be rated in accordance with AHRI Standards 210/240 and 340/360.

3. Unit shall be designed to conform to ASHRAE 15, 2001.

4. Unit shall be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL-listed and certified under Canadian standards as a total package for safety requirements.

5. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation

6. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117.

7. Unit casing shall be capable of withstanding Federal Test Method Standard No. 141 (Method 6061) 5000-hour salt spray.

8. Unit shall be designed in accordance with ISO 9001:2008, and shall be manufactured in a facility registered by ISO 9001:2008.

9. Unit shall be designed in accordance with UL Standard 1995, including tested to withstand rain.

10. Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.

C. Unit Cabinet:

1. Unit cabinet shall be constructed of G90 galvanized steel, with exterior surfaces coated with a non-chalking, powdered paint finish, certified at 1000 hours salt spray test per ASTM-B117 standards. The unit top shall be a single piece “Water Shed” design, with drip edges and no-seam corners to provide optimum water integrity. Unit shall have a rigidly mounted condenser coil guard to provide protection from objects and personnel after installation. Indoor blower section shall be insulated with up to 3/4” thick, aluminum, foil faced insulation, fastened to prevent insulation from entering the air stream. Cabinet panels shall be “large” size, easily removable for servicing and maintenance, with built-in lift handles. Unit shall be built on a formed, “Super-Structure” design base pan, with embossments at critical points to add strength, rigidity and aid in minimizing sound. Full perimeter base rails shall be provided to assure reliable transit of equipment, overhead rigging, for truck access and proper sealing on roof curb applications. Base rails shall be removable, when required, to lower unit height. Filters shall be furnished and be accessible through a removable access door, sealed airtight. Units vertical discharge and return duct configuration shall be designed to fit between standard 24” O.C. beams without modification to building structure, duct work and base unit. Condensate pan shall be internally sloped and conform to ASHRAE 62-89 self-draining standards, with 3/4” NPTI copper, ridged mount connection.

D. Indoor (Evaporator) Fan Assembly:

1. Fan shall be direct drive design. Fan wheel shall be double-inlet type with forward-curved blades, dynamically balanced to operate smoothly throughout the entire range of operation. Airflow design shall be constant air volume. Bearings shall be sealed and permanently lubricated for longer life and no maintenance. Fan assembly shall be “Slip Track” (slide-out) design for easy removal and cleaning.

E. Outdoor (Condenser) Fan Assembly

1. The outdoor fan shall be of the direct-driven propeller type, discharge air vertically, have aluminum blades riveted to corrosion resistant steel spider bracket and shall be statically balanced for smooth operation. The outdoor fan motor shall be totally enclosed with permanently lubricated bearings and internally protected against overload conditions.

F. Refrigerant Components:

1. Compressors:

a. Shall be fully hermetic type, direct drive, internally protected with internal high-pressure relief and over temperature protection. The hermetic motor shall be suction gas cooled and have a voltage range of + or - 10% of the unit nameplate voltage.

b. Shall have internal isolation and sound muffling to minimize vibration and noise, and be externally isolated on a dedicated, independent mounting.

2. Coils:

a. Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless internally enhanced copper tubes with all joints brazed.

b. Evaporator coil shall be of the direct expansion, blow through design, while condenser coil shall be draw through design.

3. Refrigerant Circuit and Refrigerant Safety Components:

a. Shall include independent fixed orifice expansion devices.

b. Shall include filter/strainer to eliminate any foreign matter.

4. Unit Controls:

a. Unit shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-volt transformer side.

b. Unit shall incorporate a lockout circuit which provides reset capability at the space thermostat or base unit should any of the following standard safety devices trip and shut off compressor:

1) Loss-of-charge/Low-pressure switch.

2) High-pressure switch.

3) Freeze-protection thermostat, evaporator coil. If any of the above safety devices trip, an LED (light-emitting diode) indicator shall flash a diagnostic code that indicates which safety switch has tripped.

4) Unit shall incorporate “AUTO RESET” compressor over temperature, over current protection.

c. Unit shall operate with conventional thermostat designs and have a low voltage terminal strip for easy hook-up.

d. Unit control board shall have on-board diagnostics and fault code display.

e. Standard controls shall include anti-short cycle and low voltage protection, and permit cooling operation down to 0 ºF.

f. Control board shall monitor each refrigerant safety switch independently.

g. Control board shall retain last 5 fault codes in non-volatile memory, which will not be lost in the event of a power loss.

G. Gas Heating Section:

1. Heat exchanger and exhaust system shall be constructed of aluminized steel and shall be designed with induced draft combustion with post purge logic and redundant main gas valve. The heat exchanger shall be of the tubular type, constructed of T1-40 aluminized steel for corrosion resistance and allowing minimum mixed air entering temperature of 40 ºF. Burners shall be of the in-shot type, constructed of aluminum-coated steel. All gas piping shall enter the unit cabinet at a single location through either the side or bottom, without any field modifications. An integrated control board shall provide timed control of evaporator fan functioning and burner ignition. Heating section shall be provided with the following minimum protection:

a. Low $NO_x$ Heat Exchanger.

b. Primary and auxiliary high-temperature limit switches.

c. Induced draft motor speed sensor.

d. Flame roll out switch.

e. Flame proving controls.

H. Unit Operating Characteristics:

1. Unit shall be capable of starting and running at 125º F outdoor temperature, exceeding maximum load criteria ARI Standard 210/240. The compressor, with standard controls, shall be capable of operation down to 45º F outdoor temperature. Accessory low ambient kit shall be available for operation to 0º F.

I. Electrical Requirement:

1. All unit power wiring shall enter unit cabinet at a single factory provided location and be capable of side or bottom entry, to minimize roof penetrations and avoid unit field modifications. Separate side and bottom openings shall be provided for the control wiring.

2. Unit shall have the GFCI Type convenience outlet.

3. All unit power wiring shall enter unit cabinet at a single, factory-prepared, knockout location.

J. Modulating Centrifugal Power Exhaust for Down Discharged Units:

1. Provide and install a modulating centrifugal power exhaust to control a neutral pressure in the space. Pressure sensor shall be installed in the space.

K. Economizer:

1. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air.

L. Filter Section:

1. Filters shall be held in place by a pivoting filter tray, facilitating easy removal and installation.

2. Shall consist of factory-installed, low velocity, 2-in. thick filters.

3. Filters shall be standard, commercially available sizes.

M. Unit shall be provided with full perimeter, galvanized steel spring isolator roof curb.

N. "Automated Logic", Direct Digital Control thermostat.

O. Manufacturer: "York" or "Carrier".

2.17 DUCT FREE FAN COIL UNIT

A. Provide factory assembled, Indoor, direct-expansion, wall-mounted fan coil. Fan coil shall be shipped complete with cooling coil, fan, fan motor, piping connectors, and integral wall mounting bracket and mounting hardware.

B. Units shall be UL approved. Each coil shall be factory tested for leakage at 350 psig air pressure with a coil submerged in water.

1. Insulation and adhesive shall meet NFPA-90A requirements for flame spread and smoke generation. Equipment wiring shall comply with NEC requirements. The unit shall be tested and certified in accordance with ARI Standard 440.

C. Unit Cabinet:

1. The cabinet shall be formed from high strength molded plastic with smooth finish, flat front panel design with access for filter. Cabinet color shall be white – Munsell 1.0Y 9.2/0.2. The unit shall be wall mounted by means of a factory supplied, pre-drilled, mounting plate.

D. Fans:

1. The indoor unit fan shall be high performance, double inlet, forward curve, direct drive sirocco fan with a single motor. The fans shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings. The indoor fan shall consist of three (3) speeds: Low, Mid, and Hi and Auto. The fan shall have a selectable Auto fan setting that will adjust the fan speed based on the difference between controller set-point and space temperature.

E. Vane:

1. There shall be a motorized horizontal vane to automatically direct air flow in a horizontal and downward direction for uniform air distribution. The horizontal vane shall significantly decrease downward air resistance for lower sound levels, and shall close the outlet port when operation is stopped. There shall also be a set of vertical vanes to provide horizontal swing airflow movement.

F. Coils:

1. The evaporator coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing. The multi-angled heat exchanger shall have a modified fin shape that reduces air resistance for a smoother, quieter airflow. All tube joints shall be brazed with PhosCopper or silver alloy. The coils shall be pressure tested at the factory. A condensate pan and drain shall be provided under the coil. An optional drain pan level switch (DPLS1), designed to connect to the control board, shall be provided if required, and installed on the condensate pan to prevent condensate from overflowing

G. Controls:

1. The control system shall consist of a minimum of two (2) microprocessors, one on each indoor and outdoor unit, interconnected by a single non-polar two-wire cable. The microprocessor located in the indoor unit shall have the capability of monitoring return air temperature and indoor coil temperature, receiving and processing commands from a wireless or wired controller, providing emergency operation and controlling the outdoor unit. The control signal between the indoor and outdoor unit shall be pulse signal 24 volts DC. Indoor units shall have the ability to control supplemental heat via connector CN152 and a 12 VDC output.

2. The temperature control range shall be from 62°F to 86°F.

3. User interface with the unit shall be accomplished via a wired thermostat that shall have the following functions as a minimum:

   a. “Automated Logic”, Direct Digital Control thermostat.

   b. Selectable automatic restart, after power failure the system will restart at the same operating conditions as before the failure.

   c. Temperature-sensing controls shall sense return air temperature at the unit or at the remote control.

   d. Indoor coil freeze protection in both cooling and heating (reversing valve failure) modes.

   e. Automatic air sweep control to provide multiple operating modes of the air sweep louvers.

   f. Dehumidification mode shall provide increased latent removal through total system modulation.

   g. Fan-only operation to provide room air circulation when no cooling is required.

   h. Diagnostics shall provide continuous checks of unit operation and warn of malfunctions. Error messages shall be displayed at the unit or the remote control.

   i. Fan speed control shall be user-selectable: high, medium, low, or microprocessor determined based on the differential between the room temperature and the set point during all modes of operations.

j. Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature in heating.

H. Filters:

1. Return air shall be filtered by means of an easily removable washable filter.

I. Condensate pump and installation kit.

J. Manufacturer: “York” or “Carrier”.

2.18 AIR-COOLED CONDENSING UNIT – OUTDOOR

A. Outdoor air-cooled split system compressor sections suitable for on-the-ground, rooftop, wall hung or balcony mounting. Units shall consist of an inverter driven, twin cylinder rotary compressor, an air-cooled coil, propeller-type draw-through outdoor fan, reversing valve, accumulator, pulse modulating valve metering device, and control box. Units shall discharge air horizontally as shown on the contract drawings. Units shall function as the outdoor component of an air-to-air heat pump system.

B. Units shall be used in a refrigeration circuit matched to duct-free fan coil units.

C. General:

1. Factory assembled, single piece, air-cooled outdoor unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and the compressor.

2. The outdoor unit shall be capable of cooling operation down to 0°F (-18°C) ambient temperature without additional low ambient controls.

D. Unit Cabinet:

1. The casing shall be constructed from galvanized steel plate, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection and have a Munsell 3Y 7.8/1.1 finish.

2. Mounting feet shall be provided and shall be welded to the base of the cabinet and be of sufficient size to afford reliable equipment mount and stability.

3. Easy access shall be afforded to all serviceable parts by means of removable panel sections.

4. The fan grill shall be of ABS plastic.

5. Cabinet mounting and construction shall be sufficient to withstand 155 MPH wind speed conditions for use in Hurricane condition areas. Mounting, base support, and other installation to meet Hurricane Code Conditions shall be by others.

E. Fans:

1. The fan blade(s) shall be of aerodynamic design for quiet operation, and the fan motor bearings shall be permanently lubricated.

2. The outdoor unit shall have horizontal discharge airflow. The fan shall be mounted in front of the coil, pulling air across it from the rear and dispelling it

through the front. The fan shall be provided with a raised guard to prevent external contact with moving parts.

F. Compressor:

1. Compressor shall be a DC twin-rotor rotary compressor with Variable Speed Inverter Drive Technology.

2. The compressor shall be driven by inverter circuit to control compressor speed. The compressor speed shall dynamically vary to match the room load for significantly increasing the efficiency of the system which shall result in significant energy savings.

3. To prevent liquid from accumulating in the compressor during the off cycle, a minimal amount of current shall be automatically, intermittently applied to the compressor motor windings to maintain sufficient heat to vaporize any refrigerant. No crankcase heater is to be used.

4. The outdoor unit shall have an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.

G. Outdoor Coil:

1. The L shaped condenser coil shall be of copper tubing with flat aluminum fins to reduce debris build up and allow maximum airflow. The coil shall be protected with an integral metal guard.

2. Refrigerant flow from the condenser shall be controlled by means of an electronic linear expansion valve (LEV) metering device. The LEV shall be controlled by a microprocessor controlled step motor.

3. All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ARC Type, meeting ASTM B280 requirements, individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero), elastomeric material for the insulation of refrigerant pipes and tubes with thermal conductivity equal to or better than 0.27 BTU-inch/hour per Sq Ft / °F, a water vapor transmission equal to or better than 0.08 Perm-inch and superior fire ratings such that insulation will not contribute significantly to fire and up to 1” thick insulation shall have a - Flame-Spread Index of less than 25 and a Smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102.

H. Refrigeration Components:

1. Refrigerant circuit components shall include brass liquid line and suction line service valves, service gage port connections with Schrader type fittings, accumulator and reversing valve.

I. Controls and Safeties:

1. Operating controls and safeties shall be factory selected, assembled, and tested. The minimum control functions shall include the following:

a. Controls:

1) A time delay control sequence is provided standard through the fan coil board.

2) Automatic outdoor-fan motor protection.

b. Safeties:

1) Diagnostics provided by matched indoor unit.

2) Compressor motor current and temperature overload protection.

3) Outdoor fan failure protection (High Pressure Switch).

4) Low Pressure Protection.

5) Fusible plug to vent refrigerant safely in case of a fire.

J. Electrical Requirements:

1. The electrical power of the unit shall be 208volts or 230 volts, single phase, 60 hertz. The unit shall be capable of satisfactory operation within voltage limits of 187 volts to 253 volts.

2. Power for the indoor unit shall be supplied from the outdoor unit via Mitsubishi Electric A-Control using three (3) fourteen (14) gauge AWG conductors plus ground wire connecting the units.

3. The outdoor unit shall be controlled by the microprocessor located in the indoor unit. The control signal between the indoor unit and the outdoor unit shall be pulse signal 24 volts DC.

4. The unit shall have Pulse Amplitude Modulation circuit to utilize 98% of input power supply and control wiring must be installed per NEC and all local electrical codes.

K. Manufacturer: “York” or “Carrier”.

2.19 EXHAUST FANS, ROOF UPBLAST TYPE

A. Roof exhaust fans shall be a spun aluminum, roof mounted, belt driven, upblast centrifugal.

B. The fan shall be of bolted and welded construction utilizing corrosion resistant. fasteners. The spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. The windband shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided into the motor compartment to facilitate wiring connections. The motor, bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators. These components shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Lifting lugs shall be provided to help prevent damage from improper lifting. Unit shall bear an engraved aluminum

nameplate. Nameplate shall indicate design CFM, static pressure, and maximum fan RPM. Unit shall be shipped in ISTA certified transit tested packaging.

C. Bearings shall be flanged and of the permanently lubricated, permanently sealed, ball bearing type capable of over 200,000 hours bearing life. The entire drive assembly and wheel shall be removable, as a complete unit, from the support structure without disassembling the external fan housing. The complete drive assembly shall be mounted on rubber vibration isolation.

D. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.

E. Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

F. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure

G. Approvals:

1. Tested and certified in accordance with AMCA Standard 210-74 and ASHRAE 51-75.

2. Underwriter’s Laboratory Listed motor.

H. Manufacturer: Design based on “Loren Cook” ACRU-B series. An equal product by “Greenheck” may be submitted for approval.

2.20 EXHAUST FANS, INLINE TYPE

A. Fan shall be duct mounted, belt driven centrifugal square inline.

B. Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

C. The fan shall be of bolted construction utilizing corrosion resistant fasteners. Housing shall be minimum 18 gauge galvanized steel with integral duct collars. Bolted access doors shall be provided on three sides, sealed with closed cell neoprene gasketing. Pivoting motor plate shall utilize threaded L-bolt design for positive belt tensioning. Housing shall be pre-drilled to accommodate universal mounting feet for vertical or horizontal installation. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static pressure, and maximum fan RPM. Unit shall be shipped in ISTA certified transit tested packaging.

D. Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.

E. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure.

F. Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball type in a pillow block cast iron housing selected for a minimumL50 life in excess of 200,000 hours at maximum cataloged operating speed.

G. Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

H. Manufacturer: Design based on “Loren Cook” SQN-B series. An equal product by “Greenheck” may be submitted for approval.

2.21 GRAVITY VENTILATOR

A. Unit shall be a hooded high efficiency roof mounted gravity relief ventilator.

B. Fan shall be manufactured at an ISO 9001 certified facility.

C. The unit shall be of bolted and welded construction utilizing corrosion resistant fasteners. The hood shall be constructed of minimum 18 gauge aluminum or 20 gauge galvanized steel, bolted to a minimum 8 gauge aluminum or 12 gauge galvanized steel support structure. A radius throat must be provided for optimum performance. Lifting lugs shall be provided to help prevent damage from improper lifting.

D. The base shall have continuously welded curb cap corners for maximum leak protection. Birdscreen constructed of 1/2" galvanized mesh shall be mounted in the hood. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM and static pressure. Unit shall be shipped in ISTA certified transit tested packaging.

E. Manufacturer: Design based on “Loren Cook” GR series. An equal product by “Greenheck” may be submitted for approval.

PART 3 - EXECUTION

3.01 EQUIPMENT INSTALLATION

A. General: Install work as indicated, in accordance with manufacturer’s instructions. Locate properly, plumb and level and securely attach to substrate foundations.

3.02 VIBRATION ISOLATORS AND SEISMIC RESTRAINTS

A. Vibration isolators and seismic restraint systems must be installed in strict accordance with the manufacturers written instructions and certified submittal data.

B. Installation of vibration isolators and seismic restraints must not cause a change of position of equipment, piping or ductwork resulting in stresses or misalignment.

C. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.

D. The contractor shall not install equipment, piping, duct or conduit which makes rigid connections with the building unless insulation unless otherwise specified. “Building” includes, but is not limited to, slabs, beams, columns, studs and walls.

E. Coordinate work with other trades to avoid rigid contact with the building.

F. Conflicts with other trades which will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractors expense.

G. Bring to the architects/engineers attention discrepancies between the specifications and the field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the responsible contractors expense.

H. Correct, at no additional cost, installations which are deemed defective in workmanship and materials at the contractor’s expense.

I. Over stressing of the building structure must not occur because of overhead support of equipment. Contractor must submit loads to the structural engineer of record for approval. Generally bracing may occur from:

   1. Flanges of structural beams.

   2. Upper truss cords in bar joist construction.

   3. Cast in place inserts or wedge type drill-in concrete anchors.

J. Seismic cable restraints as specified under products shall be installed slightly slack to avoid short circuiting the isolated suspended equipment, piping or conduit.

K. Seismic cable assemblies as specified under products are installed taut on non-isolated systems. Seismic solid braces as specified under products may be used in place of cables on rigidly attached systems only.

L. At locations where seismic restraints are attached to pipe clevis, the clevis cross bolt must be reinforced with pipe clevis bolt braces as specified under products.

M. Vibration isolation manufacturer shall furnish integral structural steel bases as required. Independent steel rails are not permitted on this project.

N. Where piping passes through walls, floors or ceilings, the vibration isolation manufacturer shall provide split wall seals as specified under products.

O. Air conditioning equipment and centrifugal fans shall be protected against excessive displacement, which results from high air thrust in relation to the equipment weight. Horizontal thrust restraint shall be as specified under products.

P. Locate isolation hangers as near to the overload support structure as possible.

Q. Seismic Restraint of Piping

1. Seismically restrain piping listed as a, b, or c below. Use seismic cable restraints if cables are isolated. Mason type SCB, SCBV, or SSB restraints may be used on an insulated piping. See paragraphs 2.01 x and 2.01AA.

    a. Gas piping piping that is 1" I.D. or larger.

    b. Piping located in boiler rooms, mechanical equipment rooms and refrigeration equipment rooms that is 1-1/4' I.D. and larger.

    c. Other piping 2-1/2" diameter and larger.

2. Transverse piping restraints shall be at 40' maximum spacing for pipe sizes, except where lesser spacing is required to limit anchorage loads.

3. Longitudinal restraints shall be at 80' maximum spacing for pipe sizes, except where lesser spacing is required to limit anchorage loads.

4. Where thermal expansion is a consideration, guides and anchors may be used as transverse and longitudinal restraints provided they have a capacity equal to or greater than the restraint loads in addition to the loads induced by expansion or contraction.

5. For fuel oil [and gas] piping transverse restraints must be at 20' maximum and longitudinal restraints at 40' maximum spacing.

6. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24" of the elbow or TEE or combined stresses are within allowable limits at longer distances.

7. Hold down clamps must be used to attach pipe to trapeze members before applying restraints in a manner similar to clevis supports.

8. Branch lines may not be used to restrain main lines.

R. Seismic Restraint of Duct Work

1. Seismically restrain ductwork with seismic cable restraints or seismic solid braces for SMACNA seismic hazard level "A" and connection level "Z" as listed below:

    a. Restrain rectangular ducts with cross sectional are of 6 sq. ft. or larger.

    b. Restrain round ducts with diameters of 28" or larger.

    c. Restrain flat oval ducts the same as rectangular ducts of the same nominal size.

2. Transverse restraints shall occur at 30' intervals or at both ends of the duct run if less than the specified interval. Transverse restraints shall be installed at each duct run and at each end of a duct run.

3. Longitudinal restraints shall occur at 60' intervals with at least one restraint per duct run. Transverse restraints for one duct section may also act as a longitudinal restraint for a duct section connected perpendicular to it if the

restraints are installed within 4’ of the intersection of the ducts and if the restraints are sized for the larger duct. Duct joints shall conform to SMACNA duct construction standards.

4. The ductwork must be reinforced at the restraint locations. Reinforcement shall consist of an additional angle on top of the ductwork that is attached to the support hanger rods. Ductwork is to be attached to both upper angle and lower trapeze.

5. A group of ducts may be combined in a larger frame so that the combined weights and dimensions of the ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details are selected.

6. Walls, including gypsum board nonbearing partitions, which have ducts running through them may replace a typical transverse brace. Provide channel framing around ducts and solid blocking between the duct and frame.

S. Seismic Restraint Exclusions

1. Piping

a. Gas piping less than 1” inside diameter.

b. Other piping less than 2-1/2” inside diameter.

c. Piping suspended by individual hangers 12” or less as measured from the top of the pipe to the bottom of the support where the hanger is attached. However, if the 12” limit is exceeded by a hanger in the run, seismic bracing is required for the run.

1) The 12” exemption applies for trapeze supported systems if the top of each item supported by the trapeze qualifies.

2. Duct Work

a. Rectangular, square or oval ducts less than 6 sq. ft. in cross sectional area.

b. Round duct less than 28” in diameter.

c. Duct suspended by hangers 12” or less in length as measured from the top of the duct to the point of attachment to the structure. Hangers must be attached within 2” of the top of the duct with a minimum of two #10 sheet metal screws. If the 12” limit is exceeded by a hanger in the run, seismic bracing is required for the run.

3. Suspended Equipment

a. VAV boxes and fan powered equipment weighing less than 50 lbs. and rigidly connected to the supply side of the duct system support with a minimum of four hanger rods.

## 3.03 DUCT SYSTEMS

A. Ductwork installation shall be coordinated with consultants’ drawings, notes and specifications.

B. Ductwork shall be fabricated to field measurements established by the Contractor on the job. Ducts shall be of sizes and configuration shown on the drawings.

C. Ducts shall be installed true to line and grade. Horizontal ducts shall be installed tight to structure to leave the greatest possible space under them. Where necessary, changes of elevation in the ducts shall be made to secure this result, but not without approval of the Architect.

D. Should it be found that necessary duct dimensions have been omitted from the drawings, Contractor shall notify the Architect, who will supply the dimensions and the Contractor shall then construct the ducts in accordance with these sizes at no extra charge. Should it be found impractical to install a duct of the exact sizes given, a duct of a different shape but having the same resistance shall be installed. The sizes of the substitute duct shall be approved by the Architect.

E. Transverse seams in duct system shall be SMACNA T-11 Standing S seam sealed airtight with U.L. listed duct sealer which meets Class 1 requirements of NFPA 90-A, as manufactured by “United”, “Duro-Dyne” or approved equal.

F. Ductwork layout: Follow as close as possible layout indicated on drawings. Secondary beams shall be furnished and installed under this Section of the specifications whenever necessary to meet these requirements.

G. Swaged joints: Elbows in round ducts may be adjustable type formed by mechanically interlocked swaged joint. Three-piece adjustable elbows may be used for turns up to 45 degrees and five-piece elbows shall be used for turns greater than 45 degrees. Apply duct sealer to swaged joints to seal against air leakage.

H. Tees and elbows connecting to round spiral ductwork shall have crimped ends for insertion limits. Tee fittings are required for tee connections in conjunction with spiral ductwork. Cutting of the spiral ductwork for direct connection of a tee branch is prohibited.

I. Branch duct outlets of tee fittings may be attached using Pittsburgh lock, clinch lock, and/or inside the collar attached with sheet metal screws and continuously caulked with duct sealer.

J. Connection of round to rectangular ducts: Where more than one round duct connects into a rectangular plenum, spin-in fittings with manual damper or fittings with collars (having manual damper) attached by sheet metal screws may be used. These shall be completely made airtight at the joint by continuous caulking with duct sealer. Provide an adjustable extractor.

K. Attach crimped and slip-in joints with sheet metal screw and make airtight with continuous caulking with duct sealer.

L. Flexible round duct connectors: Length of a flexible round duct connector in a branch duct shall not exceed 6’, but shall not be less than directed. The installation shall be such that the centerline radius of a bend shall be not less than two diameters. Connections to metal fittings shall be made with sealer and strap clamps. Excess length of the connector shall be cut off and not bunched together, thus impeding a proper air blow. Shall not penetrate a wall without the Architect’s approval.

M. Duct materials: Sides, including bottom and top of ducts and plenums, shall be constructed of sheet metal. No portion of the building construction, such as walls or slabs, shall be used as part of a duct or plenum unless called for on the drawings or otherwise specified.

N. Ductwork dimensions: Duct dimensions indicated are inside dimensions for the net free area. If ducts are lined, the duct dimensions indicated are dimensions for the net free area inside the lining and the outer, or overall, dimensions of the actual ducts shall be increased accordingly to accommodate the duct lining specified.

O. Ductwork installation: Ductwork shall be installed true to line and grade and with seismic restraints in accordance with SMACNA Guidelines for Seismic Restraints of Mechanical Systems and Plumbing piping systems. Should it be found impractical to install a duct of the exact sizes given, a duct of a different shape but having the same resistance shall be installed. Ductwork shall be connected to fire/smoke damper sleeves or assemblies in such a way that collapse of the ductwork shall not dislodge the damper or impair its proper operation. In addition to seismic restraints per above standard, duct hanger construction and spacing shall be per Uniform Mechanical Code. The most stringent, the SMACNA Guidelines for seismic restraints, Uniform Mechanical Code or the State Mechanical Code, shall be applicable.

P. Ducts shall not be supported from decking. Furnish and install structural members to span steel purlins to distribute the load. Refer to roof shop drawings for location of beams and purlins for additional structural members for hangers.

Q. Outlets Installation: Diffusers, registers, and grilles in ceilings and walls shall be located in accordance with Architectural reflected ceiling plans and interior elevation plans whenever such drawings exist. Locations on Mechanical Drawings are only approximate.

R. Changes in Duct Elevation, unless otherwise shown, fitting shall be made by either of the following:

1. By curved sections of a minimum throat radius equal to the duct dimension in the place of the bend.

2. By mitered elbows made with double thickness (formed) type turning vanes. Turning vanes in mitered elbows in lined ducts shall be factory manufactured extruded aluminum double thickness (formed) types with acoustical insulation between double wall and shall be approved equal to Sono Turn, manufactured by Sound Control Products Co., Palo Alto, California.

S. Duct Transition Sections: Changes in the size of ducts shall be made by uniformly tapering sections with a maximum included angle of divergence of 20 degrees for enlargements and a maximum included angle of convergence of 45 degrees fro contractions.

T. Flexible Connections: Provide where indicated on drawings and at the ducted discharge and inlet of every air handling unit, fan-coil unit and fan. Connection shall be waterproof, fire-retardant and flexible.

1. Connection construction: At least 1” slack shall be allowed in flexible connections to insure that no vibration is transmitted from fan to ductwork or plenum. The fabric shall either be folded in with the metal or attached with metal

collar frames at each end to prevent air leakage. Equipment shall be arranged and access doors provided as necessary to permit the convenient replacement of the flexible connection after initial installation.

U. Flashing Duct through Roof: Install flashing to cover top and sides of curb and fit closely around duct. Cover top edge of base flashing with a collar soldered to duct and turned down over base flashing. Fabricate flashing from 24-gauge galvanized steel sheet (minimum).

V. Manual Volume Dampers:

1. Required in the following locations:

a. Where indicated on drawings.

b. In each supply, return and exhaust duct branch.

c. In the main supply duct from an air handling unit. Locate dampers close to unit.

2. Access doors in ducts and plenums:

a. Required in the following locations:

1) Where indicated on drawings.

2) Where specified herein.

3) Fire damper access door location: At every fire damper, locate an access door to provide convenient accessibility to linkage and fusible link. Unless otherwise called for, access door not required when linkage and fusible link are conveniently accessible through a duct having open ends. Door shall be minimum 14” x 14” where duct size permits.

4) Automatic damper access door location: At every automatic damper, locate an access door to provide convenient accessibility to a damper linkage and damper operator when mounted inside of the duct or plenum. Unless otherwise called for, access door not required when damper linkage and damper operators are conveniently accessible through a duct having open end.

W. Automatic Dampers: Install automatic dampers called for elsewhere on drawings and in the specifications.

X. Cleaning: After completed installation of ductwork, entire new and existing system shall be cleaned of rubbish, plaster, dirt and other debris. After installation of equipment and connections are made on the fan, and before grilles, outlets or registers are installed, entire system shall be blown out with dampers and outlets wide open. During this initial operation of the fans, [new and existing] duct openings, diffusers takeoffs, spin-in fittings, etc., shall be covered with two layers of cheese cloth to protect building equipment.

## 3.04 ACCESS TO EQUIPMENT

A. General:

1. Ductwork, equipment, and accessories shall be installed to permit access for maintenance.

2. Relocation of conduit, piping, equipment, and accessories required to provide maintenance access shall be accomplished by the Contractor at no additional cost to the Owner.

B. Access:

1. Provide access doors where dampers, instruments, controls, motors and other equipment requiring access for servicing, repairs or replacement are located behind walls, chases, or above non-removable ceilings.

2. The location of access doors shall be coordinated with and installed by the applicable trade installing walls or ceilings.

3. Contractor shall arrange for the necessary openings in the building to allow for admittance of apparatus.

3.05 AIR INLETS

A. Intake ducts not protected by a louver, grille, or register shall have a 1/2” mesh-galvanized screen over an open end.

B. Paint ductwork visible through grilles, registers, and other openings with one coat of flat black paint.

3.06 PIPING SYSTEMS

A. General: Apparatus, fixtures, devices and appliances which require pipe connections shall be so equipped and each such pipe connection shall be valved or trapped, or provided with special apparatus as indicated on the drawings or elsewhere specified. Where such connections are not indicated on the drawings or specified, they shall be made in the usual manner recommended by the manufacturer of each such equipment.

B. Reduced fittings shall be used in lieu of bushings. Close nipples will not be permitted.

C. Pipe lines shall be installed in the locations and of the sizes shown on the drawings or specified herein and of the materials and workmanship herein specified and shall be free from stains, tool marks, or other foreign substances.

D. Piping shall be installed parallel to or at right angles to the building walls. Pipe lines shall be installed free from traps and air pockets and true to line and grade. Horizontal lines shall be installed as close to the building construction as possible so as to leave the greatest possible head room under them.

E. The only filler that may be used in making up screw joints in pipe lines shall be an approved graphite paste or Teflon tape.

F. Where pipes of two dissimilar metals are joined, “Mallory” dielectric couplings or approved equal shall be installed.

G. Hangers and Supports:

1. Horizontal pipe lines shall be carried by hangers or supports spaced according to the following schedule:

| **SCHEDULE 40** | **STEEL PIPE** | **COPPER TUBING** | |
|---|---|---|---|
| Size | Maximum Spacing | Tube O.D. | Maximum Spacing |
| 1-1/4" or less | 8'-0" | 5/8" or less | 6'-0" |
| 1-1/2" - 2-1/2" | 10'-0" | 7/8" – 1-1/8" | 8'-0" |
| 3" or larger | 12'-0" | 2-5/8"-5-1/8" | 12'-0" |

2. Where two or more lines are run at the same elevation, trapeze hangers constructed of "Unistrut" or "Elcen" channels with rods as specified herein may be used. Provide separate hangers for each branch offset three feet or more in length. Hangers shall be set so as to allow the pipe to adjust itself to changes produced by expansion and contraction.

3. Pipes shall not be supported from decking. Furnish and install structural members to span steel purlins to distribute the load. Refer to roof shop drawings for location of beams and purlins to provide additional structural members for hangers. Provide additional supports for upper attachments for piping supports with a secondary steel support system consisting of a structural steel channel securely between beams or purlins. Furnish additional "Unistrut" channel (back-to-back 1-5/8" x 1-5/8" x 0.010" roll formed) members. Clamp, brackets, etc., for complete support of piping and sway bracing. Do not penetrate metal decking with fasteners.

4. Hangers, unless otherwise noted on the drawings, for pipe lines shall be heavy duty clevis type: "Grinnel" Fig. 260 or approved equal. Hangers shall be supported on threaded rod hangers of the following minimum sizes:

| **PIPE SIZE** | **ROD DIA.** |
|---|---|
| 2" and less | 3/8" |
| 2-1/2" and 3" | 1/2" |
| 4" and 5" | 5/8" |
| 6" | 3/4" |

5. Seismic Bracing: Where hanger rods on horizontal runs of pipe are 24" in length or longer, Contractor shall provide transverse and longitudinal sway bracing angles in accordance with SMACNA Seismic Restraint Guide for Piping or Uniform Mechanical Code, whichever is the most stringent.

6. Condensate Drain (Waste) shall be installed in accordance with local code. Collect from aircoils, fuel-burning condensing appliances, overflows from water supplied equipment and discharge to approved plumbing fixture. Slope shall not be less than 1%. Size shall not be less than specified UMC.

7. Identification of Piping: Paint and identify exposed piping, as specified in Section 15010.

## 3.07 PIPE TESTING

A. Test piping system in accordance with ANSI/ASME B31.9.

B. Test refrigeration system in accordance with ANSI/ASME B31.5.

C. Pressure test refrigeration system with dry nitrogen to 200 psig. Perform final tests at 27 inches vacuum and 200 psig using electronic leak detector. Test to no leakage.

D. Fully charge completed system with refrigerant after testing.

## 3.08 FINAL CONNECTIONS

A. Provide final connections to equipment including fill or make-up water for heating and cooling systems.

## 3.09 EXAMINATION AND PREPARATION

A. Verify that ductwork has been tested for leakage in accordance with SMACNA standards before applying insulation materials.

B. Verify that equipment and surfaces are clean, dry and free of foreign material.

C. Verify piping has been tested as specified.

## 3.10 INSULATION

A. Install materials in accordance with manufacturer’s recommendations, building codes and industry standards.

B. Continue insulation vapor barrier through penetrations, except where prohibited by code.

C. Piping Insulation

1. Locate insulation and cover seams in least visible locations.

2. Neatly finish insulation at supports, protrusions and interruptions.

3. Provide insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature with vapor retardant jackets with self-sealing laps. Insulate complete system.

4. In dual temperature systems seal pipe terminations including fittings, wall penetrations and pipe supports with vapor barrier mastic. In brine or chilled water, pipe systems seal pipe terminations every four pipe sections.

5. For insulated pipes conveying fluids above ambient temperature, secure jackets with a self-sealing lap or outward clinched, expanded staples. Bevel and seal ends of insulation of equipment, flanges, and unions.

6. Provide inserts between support shield and piping on piping 1-12” inches diameter or larger. Fabricate of Johns Manville Thermo-12 or other heavy

density insulating materials suitable for temperature. Insulation inserts shall not be less than the following lengths:

| | |
|---|---|
| 1-1/2” to 2-1/2” pipe size | 10” long |
| 3” to 6” pipe size | 12” long |
| 8” to 10” pipe size | 16” long |
| 12” and over | 22” long |

7. For pipe exposed in mechanical equipment rooms or in finished spaces, finish with Manville aluminum jacket.

8. For exterior applications, provide weather protection jacket or coating. Insulated pipe, fittings, joints and values shall be covered with Johns Manville aluminum jackets. Jacket seams shall be located on the bottom side of horizontal piping.

D. Equipment Insulation:

1. Apply insulation as close as possible to equipment by grooving, scoring and beveling insulation, if necessary. As required, secure insulation to equipment with studs, pins, clips, adhesive, wires or bands.

2. Fill joints, cracks seams, and depressions with bedding compound to form a smooth surface. On cold equipment, use vapor retardant cement.

3. Provide insulated dual temperature equipment or cold equipment containing fluids below ambient temperature with vapor retardant jackets.

4. For insulated equipment containing fluids above ambient temperature, provide jacket with or without a vapor barrier.

5. Cover insulation with metal mesh and finish with a heavy coat of insulting aluminum jacket.

6. For equipment in mechanical equipment rooms or in finished spaces, finish with Johns Manville aluminum jacketing.

7. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.

8. When equipment with insulation requires periodic opening for maintenance, repair, or cleaning, install insulation in such a manner that it can be easily removed and replaced without damage.

9. For exterior applications, provide weather protection jacket or coating. Insulated equipment shall be covered with Johns Manville aluminum jacketing.

E. External Ductwork Insulation:

1. Provide insulated ductwork conveying air below ambient temperature with a vapor retardant jacket. Seal vapor retardant jacket seams and penetrations with UL listed apes or vapor retardant adhesives.

2. Continue insulation through walls, sleeves, hangers, and other duct penetrations except where prohibited by code.

3. The underside of ductwork 24” or greater shall be secured with mechanical fasteners and speed clips spaced approximately 18” on the center. The protruding ends of the fasteners should be cut off flush after the speed clips are installed, and then, when required, sealed with the same tape as specified above.

4. For ductwork exposed to physical abuse in mechanical equipment rooms or in finished spaces, finish with Johns Manville or aluminum jackets.

5. Cover exterior of ductwork located outdoors insulation with 0.106 inch thick aluminum jackets metal weather cover sealed watertight and having a 1 inch slope on top of duct between the center of duct and longitudinal edges.

F. Exterior Ductwork Installation:

1. Provide 1” inch slope on top of duct between the center of duct and longitudinal edges.

G. Duct Liner:

1. Adhere insulation to sheet metal with full coverage of a UL listed adhesive ASTM C 916.

2. In addition, secure insulation with mechanical liner fasteners in a manner indicated by SMACNA or manufacturer. Pin length should be such as to limit compression of liner to 1/8”.

3. Exposed edges of the liner must be factory or field coated. For systems operating at 2000 fpm or higher, a metal nosing must be installed in liner leading edges.

4. Repair liner surface penetrations with UL listed adhesive. ASTM C 916 or superseal.

5. Duct dimensions indicated are net inside dimensions. Increase duct size to allow for insulation thickness.

H. Refrigerant System: Install refrigeration specialties in accordance with manufacturer’s instructions.

## 3.11 DUCTWORK LEAKAGE TEST

A. Air Balance Contractor shall conduct leakage test on ductwork. Test shall be performed prior to installing ductwork insulation.

B. Systems shall be inspected and tested to positive and negative pressures, in accordance with the following:

1. There are no visible mechanical defects.

2. There is no audible leakage at a point when area ambient noise is at normal occupancy level.

3. No leakage is perceptible to the hand, when placed within 6 inches of a joint.

C. Measured total system leakage shall not exceed 1 percent of total system cubic feet per minute (cfm) when tested in accordance with “Leak Tests.”

D. Leak Tests: Test apparatus and procedures shall be similar to those defined in SMACNA-07. Filtered blower inlet and automatic safety relief device shall be provided to protect system. Accuracy of measurement of leakage flow rate shall be certified to be within 1 percent of total system flow.

E. Test Apparatus

1. Test apparatus shall consist of:

a. A source of high pressure air – a portable rotary blower or tank type vacuum cleaner.

b. A flow measuring device usually an orifice assembly consisting of straightening vanes and an orifice plate mounted in a straight tube with properly located pressure taps. Each orifice assembly shall be accurately calibrated to its own calibration curve. Pressure and flow readings are usually taken with U-tube manometers.

F. Test Procedures

1. Test for audible leaks as follows:

a. Close off and seal openings in the duct section to be tested. Connect the test apparatus to the duct by means of a flexible duct section.

b. Start the blower with its control damper closed (some small blowers popularly used for testing ducts may damage the duct because they can develop pressures up to 25 inches wg).

c. Gradually open the inlet damper until the duct pressure reaches 3 inches wg. Test pressure is read on manometer No. 1. Note that the pressure is indicated by the difference in level between the two legs of the manometer and not by the distance from zero to the reading on one leg only.

d. Survey joints for audible leaks. Mark each leak and repair after shutting down blower. Do not apply a retest until sealants have set.

2. After audible leaks have been sealed, the remaining leakage should be measured with the test apparatus orifice section as follows:

a. Start blower and open damper until pressure reaches 25 percent in excess of designed duct operating pressure.

b. Read the pressure differential across the orifice on the manometer No. 2. Leakage rate in cfm is read directly from the calibration curve. If leakage does not occur the pressure differential will be zero.

c. Total allowable leakage should not exceed 1 percent of the total system design air flow rate. When partial sections of the duct system are tested, the summation of the leakage for sections shall not exceed the total allowable leakage.

d. If audible leaks have been corrected, it is unlikely that the measured leakage will exceed one percent of capacity. If it does, the leaks shall be located by careful listening or feeling along the joint.

e. It should be noted that even though a system may pass the measured leakage test, a concentration of leakage at one point may result in a noisy leak that shall be corrected.

G. Test Report Criteria: A test report shall be provided for each system tested, identified by system or section thereof, and containing leak-test curves for apparatus used and data pertinent to acceptance requirements.

## 3.12 BALANCING

A. Total system balance shall be performed by an agency approved by the Owner's Representative. Work done by this agency shall be by qualified technicians under the direct supervision of a Certified Test and Balance Engineer.

B. The responsibility for performing total system balance is "the overall concept requires that one source be responsible for the complete testing, adjusting and balancing of air system."

C. Total system balance shall be performed in accordance with the latest edition of the test agency standards in accordance with the scope of work specified in the contract documents.

D. Total system balance shall not begin until systems are complete.

E. One agency shall be responsible for total system balance.

F. The Test and Balance Agency shall permanently mark the settings of valves, dampers and other adjustment devices in a manner that will allow the settings to be restored. If a balancing device is provided with a memory stop, it shall be set and locked.

G. The name of the Test and Balance Agency, plus the name and registration number of the Certified Test and Balance Engineer, shall be submitted to the Owner's Representative for approval within 30 days after the award of the project contract.

H. The select Test and Balance Agency shall submit to the Owner's Representative:

1. Detailed procedures

2. Agenda

3. Report Forms

4. Agency Project Performance Guaranty

5. An approved copy of each of the above must be returned to the Test and Balance Agency before total system balance is begun.

I. If a complete submittal in accordance with previous paragraphs is not received within the specified time, the Owner's Representative reserves the right to select the Test and Balance Agency.

J. The Contractor shall provide the Test and Balance Agency with data specified in the standards.

K. Quality Assurance

1. Test and balance agency shall be a company specializing in the adjusting and balancing of systems specified in this Section with minimum three years documented] experience certified by AABC. Perform work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor.

L. Examination

1. Before commencing work, verify that systems are complete and operable. Ensure the following:

   a. Equipment is operable and in a safe and normal condition.

   b. Temperature control systems are installed complete and operable.

   c. Proper thermal overload protection is the place for electrical equipment.

   d. Final filters are clean and in place. If required, install temporary media in addition to final filters.

   e. Duct systems are clean of debris.

   f. Correct fan rotation.

   g. Fire and volume dampers are in place and open.

   h. Coil fins have been cleaned and combed.

   i. Access doors are closed and duct end caps are in place.

   j. Air outlets are installed and connected.

   k. Duct system leakage has been minimized.

2. Report defects or deficiencies noted during performance of services to the Architect.

3. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.

4. If, for design reasons, system cannot be properly balanced, report as soon as possible.

5. Beginning of work means acceptance of existing conditions.

M. Preparation

1. Provide instruments required for testing, adjusting and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

2. Provide additional balancing devices as required.

N. Installation Tolerances

1. Adjust air handling systems to plus or minus 5 percent for supply systems and plus or minus 10 percent for return and exhaust systems from figures indicated.

2. Adjust zones to plus or minus 5 percent.

3. Adjust more than one diffusers to plus or minus 10 percent.

O. Adjusting

1. Adjust work under provisions of this Section.

2. Recorded data shall represent actually measured or observed condition.

3. Permanently mark settings of valves, dampers and other adjustment devices allowing settings to be restored. Set and lock memory stops.

4. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

5. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes and restoring thermostats to specified settings.

6. At final inspection, recheck random selections of data recorded in the report. Recheck points or areas as selected and witnessed by the Owner and Architect.

P. Air System Procedure

1. Adjust air handling and distribution systems to provide required or design supply, return and exhaust air quantities at site altitude.

2. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

3. Measure air quantities at air inlets and outlets.

4. Adjust distribution system to obtain uniform space temperature free from objectionable drafts and noise.

5. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

6. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

7. Provide system schematic with required and actual air quantities recorded at each outlet and inlet.

8. Measure static air pressure conditions on the air supply units, including filter and coil pressure drops and total pressure across the fan. Make allowances for 50 percent loading of filters.

9. Adjust outside air automatic dampers, outside air, return air and exhaust dampers for design conditions.

10. Measure temperature conditions across outside air, return air and exhaust dampers to check leakage.

11. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling and at a minimum air flow rate, full heating.

12. Measure building static pressure and adjust supply, return and exhaust air systems to provide required relationship between each to maintain approximately 0.1 inches positive static pressure near the building entries.

## 3.13 DUCT CLEANING

A. Wire brush and vacuum the interior of the air handlers, including the fans and filter racks.

B. Encapsulate deteriorating fiberglass at air handler liner.

C. Apply coil cleaner to the cooling coil and comb the dirt from between the fins.

D. Pressure wash the coils.

E. Cut access openings in the ductwork as necessary to permit thorough cleaning.

F. Disconnect the ductwork at the joints.

G. Hand vacuum and brush the interior of the supply and return ductwork.

H. Reconnect duct joints.

I. Cover access openings with sheet metal panels. Panels will be caulked airtight and screwed in place.

J. Exterior duct insulation removed in the process of cleaning will be tacked, taped or glued back in place.

K. Remove, clean and reinstall the supply and return registers.

L. Desks, equipment, etc., in work areas will be covered with clean drop cloths.

## 3.14 TESTS

A. General:

1. Power, water and fuel required for tests will be furnished as specified under the General Conditions or General Requirements Sections. Other materials, gauges, test thermometers, and labor necessary shall be furnished by this Contractor.

2. Should a piece of apparatus or a material or work fail in one of these tests, it shall be removed immediately and be replaced by perfect material at the Contractors expense. Such portions of work so replaced shall be retested. Tests shall be performed in the presence of the Architect.

B. Equipment:

1. After the entire heating, ventilating and air conditioning system installation has been completed, ducts installed, and dampers adjusted, etc., a complete test of each air conditioning unit shall be made to determine whether the equipment fulfills the guarantee regarding the quantity of air delivered, efficiency, noiseless operation and other requirements.

2. Contractor shall furnish labor necessary to adjust the operation of the apparatus and make the connections for the test. Contractor shall replace fuses blown during the tests. After the tests, restore connections, apparatus, etc., to their proper condition.

3. Contractor shall demonstrate proper operation of the temperature control system and control system interlocks.

4. Provide Owner with report certifying that systems are operating properly.

3.15 OPERATION

A. Operational Readiness: The Contractor shall insure that the complete installation including equipment and controls, is complete, operating, checked, and adjusted at the time of final inspection. Contractor shall provide one complete extra set of filters, which shall be installed in units prior to final inspection.

B. The Contractor shall be held responsible for delays incurred and/or reinspections required due to lack of above-mentioned readiness.

C. Each entire system shall be operated continuously for a period of three full days, at a time requested by the Owner, to prove that the systems will fulfill guaranteed requirements.

END OF SECTION

# SECTION 15950

# BUILDING CONTROL SYSTEM

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Section 15010, “Basic Mechanical Requirements” applies to the work of this Section.

B. The work listed or required by this section of the specifications is not intended to limit or establish the extent of the Building Control System work.

### 1.02 DESCRIPTION

A. Work Included: The work includes the furnishing of labor, materials, appliances and tools necessary for the installation, in complete working order, of the Control System as herein specified and as indicated on the drawings. The items of work shall include, but shall not be limited to, the following principal items:

1. Furnish labor, materials, equipment and service necessary for a complete and operating control system as shown on the drawings and as described herein.

2. Furnish labor, materials and equipment necessary to meet the functional intent of the system as specified herein and as shown on the drawings. Drawings are diagrammatic only.

3. Equipment and labor not specifically referred to herein or on the plans, which are required to meet the functional intent, shall be provided without additional cost to the Owner.

4. Includes wiring inside system control panels, remote wiring between system control circuits and wiring for direct digital control systems that is not specifically shown to be included under Division 16. Wiring shall be installed per requirements of Division 16 and applicable local codes.

### 1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 15010 Basic General Mechanical Requirements:

1. Refer to other Division 15 sections for installation of wells, valve bodies and dampers in mechanical systems.

2. Work designated specified or shown to be installed or performed by other sections of the specifications.

3. Power wiring.

4. Start-stop push buttons.

5. Hand-off-auto selector switches.

6. Pilot lights.

7. Fire alarm system including wiring devices and relays to stop and start systems in accordance with fire and smoke control sequence.

8. 120-volt power connections to control equipment as shown on mechanical or electrical drawings.

1.04 EQUIPMENT RESTRICTIONS

A. Refer to Section 15010.

1.05 DEFINITIONS

A. Analog: A continuously variable system or value not having discrete levels. Typically exists within a defined range of limiting values.

B. Binary: A two-state system where an “ON” condition is represented by one discrete signal level and an “OFF” condition is represented by a second discrete signal level.

C. Building Management System (BMS): The total integrated system of fully operational and functional elements, including equipment, software, programming, and associated materials, to be provided by this Division BMS Contractor and to be interfaced to the associated work of other related trades.

D. BMS Contractor: The single Contractor to provide the work of this Division. This Contractor shall be the primary manufacturer, installer, commissioner and ongoing service provider for the BMS work.

E. Control Sequence: An BMS pre-programmed arrangement of software algorithms, logical computation, target values and limits as required to attain the defined operational control objectives.

F. Direct Digital Control: The digital algorithms and pre-defined arrangements included in the BMS software to provide direct closed-loop control for the designated equipment and controlled variables. Inclusive of Proportional, Derivative and Integral control algorithms together with target values, limits, logical functions, arithmetic functions, constant values, timing considerations and the like.

G. BMS Network: The total digital on-line real-time interconnected configuration of BMS digital processing units, workstations, panels, sub-panels, controllers, devices and associated elements individually known as network nodes. May exist as one or more fully interfaced and integrated sub-networks, LAN, WAN or the like.

H. Node: A digitally programmable entity existing on the BMS network.

I. BMS Integration: The complete functional and operational interconnection and interfacing of all BMS work elements and nodes in compliance with all applicable codes, standards and ordinances so as to provide a single coherent BMS as required by this Division

J. Provide: The term “Provide” and its derivatives when used in this Division shall mean to furnish, install in place, connect, calibrate, test, commission, warrant, document and supply the associated required services ready for operation.

K. PC: IBM-compatible Personal Computer from a recognized major manufacturer

L. Furnish: The term “Furnish” and its derivatives when used in this Division shall mean supply at the BMS Contractor’s cost to the designated third party trade contractor for installation. BMS Contractor shall connect furnished items to the BMS, calibrate, test, commission, warrant and document.

M. Wiring: The term “Wiring” and its derivatives when used in this Division shall mean provide the BMS wiring and terminations.

N. Install: The term “Install” and its derivatives when used in this Division shall mean receive at the jobsite and mount.

O. Protocol: The term “protocol” and its derivatives when used in this Division shall mean a defined set of rules and standards governing the on-line exchange of data between BMS network nodes.

P. Software: The term “software” and its derivatives when used in this Division shall mean all of programmed digital processor software, preprogrammed firmware and project specific digital process programming and database entries and definitions as generally understood in the BMS industry for real-time, on-line, integrated BMS configurations.

Q. The use of words in the singular in these Division documents shall not be considered as limiting when other indications in these documents denote that more than one such item is being referenced.

R. Headings, paragraph numbers, titles, shading, bolding, underscores, clouds and other symbolic interpretation aids included in the Division documents are for general information only and are to assist in the reading and interpretation of these Documents

S. The following abbreviations and acronyms may be used in describing the work of this Division:

| | | |
|---|---|---|
| ADC | - | Analog to Digital Converter |
| AI | - | Analog Input |
| AN | - | Application Node |
| ANSI | - | American National Standards Institute |
| AO | - | Analog Output |

| | | |
|---|---|---|
| ASCII | - | American Standard Code for Information Interchange |
| ASHRAE | | American Society of Heating, Refrigeration and Air Conditioning Engineers |
| AWG | - | American Wire Gauge |
| CPU | - | Central Processing Unit |
| CRT | - | Cathode Ray Tube |
| DAC | - | Digital to Analog Converter |
| DDC | - | Direct Digital Control |
| DI | - | Digital Input |
| DO | - | Digital Output |
| EEPROM | - | Electronically Erasable Programmable Read Only Memory |
| EMI | - | Electromagnetic Interference |
| FAS | - | Fire Alarm Detection and Annunciation System |
| GUI | - | Graphical User Interface |
| HOA | - | Hand-Off-Auto |
| ID | - | Identification |
| IEEE | - | Institute of Electrical and Electronics Engineers |
| I/O | - | Input/Output |
| LAN | - | Local Area Network |
| LCD | - | Liquid Crystal Display |
| LED | - | Light Emitting Diode |
| MCC | - | Motor Control Center |
| NC | - | Normally Closed |
| NIC | - | Not In Contract |
| NO | - | Normally Open |
| OWS | - | Operator Workstation |
| OAT | - | Outdoor Air Temperature |
| PC | - | Personal Computer |
| RAM | - | Random Access Memory |
| RF | - | Radio Frequency |
| RFI | - | Radio Frequency Interference |
| RH | - | Relative Humidity |
| ROM | - | Read Only Memory |
| RTD | - | Resistance Temperature Device |
| SPDT | - | Single Pole Double Throw |
| SPST | - | Single Pole Single Throw |
| XVGA | - | Extended Video Graphics Adapter |
| TBA | - | To Be Advised |
| TCP/IP | - | Transmission Control Protocol/Internet Protocol |
| TTD | - | Thermistor Temperature Device |
| UPS | - | Uninterruptible Power Supply |
| VAC | - | Volts, Alternating Current |
| VAV | - | Variable Air Volume |
| VDC | - | Volts, Direct Current |

WAN - Wide Area Network

1.06 SUBMITTALS

A. Refer to Section 15010.

B. The Controls Contractor shall submit AutoCAD generated schematic drawings for the entire control system for review and approval before work shall begin. Included in the submittal drawings shall be a one-page diagram depicting the system architecture complete with a communication riser. Drawings shall include point-to-point wiring diagrams and must show temperature controls, start-stop arrangement for each piece of equipment, equipment interlocks, wiring terminal numbers and special connection information required for properly controlling the mechanical equipment. The submittal shall include a bill of material reference list as well as equipment sequences of operation.

C. The submittals shall include manufacturer's catalog data describing each item of control equipment or component provided and installed for the project.

D. The submittals shall include a specification compliance analysis for review and approval before work shall begin. The compliance document shall address each paragraph of the specification by indicating Comply, Exceed or Exception. Do not indicate Comply unless the proposed system exactly meets the paragraph requirement. If Exceed or Exception is indicated, then provide a clear and concise explanation of the variance from the specifications and the net effect this would have on the specified system performance.

1.07 QUALITY ASSURANCE

A. System Manufacturer

1. The system manufacturer shall be a firm regularly engaged in the manufacture of a full line of pneumatic, electronic and computer based controls of the type required by this project. System manufacturer shall have maintained an installing, contracting and servicing field office, either factory owner or an exclusive factory authorized representative, in the local of this project for at least ten years. Manufacturers are: "Automated Logic Open BACNet". No substitutions are allowed.

2. System must match existing using campus standards as dictated by this specification. Gateway, integrator, or "blackbox" communications interfaces are not acceptable. All functionality of the Automated Logic Open BACNet System shall be provided at new and existing workstations including but not limited to: trending, archiving, custom reporting, system profiler, programming scheduling etc.

3. Automated Logic branch installer name and business address shall be listed by the Contractor in the Bid Proposal Package alone with a certificate verifying factory certified status.

B. System Contractor

1. Acceptable direct factory branch contractor:

a. Jess Lams, Sunbelt

b. 735 N. Todd Ave., Azusa, CA 91702

c. Tel: 626-610-2340 Ext. 3128

C. Installation and Commissioning

1. Work described in this section shall be installed under the supervision of factory trained engineers and mechanics qualified for this work and in the regular employ of the system manufacturer's or system manufacturer certified contractor's field office. Engineering, programming, testing, calibration and checkout shall be performed by employees of the system manufacturer's or system manufacturer certified contractor's field office.

D. Underwriters Laboratory Listing

1. Components of the system shall be UL listed and labeled. The listing number and category shall be provided upon request by the Owner or his Architect or Engineers.

E. Wire and Conduit

1. Electrical wiring, wiring connection and conduits required for the installation of the building control system shall be provided by the control contractor.

2. Wiring and conduits shall comply with the requirements of Division 16 and the local and national electrical codes. Communication and sensor cable may be installed without conduit in ceiling spaces where permitted by code.

1.08 SUBMITTALS

A. In addition to the requirements of Section 15010, submittals brochures shall include the following specified items.

B. Submittal shall consist of a complete list of equipment and materials, including manufacturer's catalog cuts and installation instructions. Shop drawings shall also contain complete wiring and schematic diagrams, software descriptions, calculations and other details required to demonstrate that the system has been coordinated and will properly function as a system. Terminal identification for control wiring shall be shown on the shop drawings. A complete written Sequence of Operation shall also be included with the submittal package.

C. The Controls Contractor shall submit AutoCAD generate schematic drawings for the entire control system for review and approval before work shall begin. Included in the submittal drawings shall be a one-page diagram depicting the system architecture complete with a communication riser. Drawings shall include point-to-point wiring diagrams and must show temperature controls, start-stop arrangement for each piece of equipment, equipment interlocks, wiring terminal numbers and special connection information required for properly controlling the mechanical equipment. The submittal shall include a bill of material reference list as well as equipment sequences of operation.

D. The submittals shall include manufacturer's catalog data describing each item of control equipment or component provided and installed for the project.

E. The submittals shall include a specification compliance analysis for review and approval before work shall begin. The compliance document shall address each paragraph of the specification by indicating Comply, Exceed or Exception. Do not indicate Comply unless the proposed system exactly meets the paragraph requirement. If Exceed or Exception is indicated, then provide a clear and concise explanation of the variance from the specifications and the net effect this would have on the specified system performance

F. Upon completion of the work, provide two complete sets of drawings and application software on magnetic floppy disk media. File drawings shall be the latest version of AutoCAD files.

1.09 RECORD DOCUMENTATION

A. Operation and Maintenance Manuals:

1. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on Compact Disc media, and include the following for the BMS provided:

a. Table of contents.

b. As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.

c. Manufacturers product data sheets or catalog pages for all products including software.

d. System Operator's manuals.

e. Archive copy of all site-specific databases and sequences.

f. BMS network diagrams.

g. Interfaces to all third-party products and work by other trades.

2. The Operation and Maintenance Manual CD shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents.

1.10 WARRANTY

A. Provide a one-year labor and material warranty on the BMS.

B. If within twelve (12) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the BMS Contractor at the cost of the BMS Contractor.

C. Maintain an adequate supply of materials within 100 miles of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during BMS Contractor's normal business hours.

1.11 MAINTENANCE AGREEMENT

A. The system contractor shall provide its standard full maintenance service agreement for execution by the Owner. The fee for the warranty periods shall be marked "prepaid" on the agreement. The fee for subsequent years shall be indicated on the agreement. The agreement shall provide for cancellation at anniversary date so that continuation of the agreement after the warranty period is optional on the part of the Owner.

1.12 SOFTWARE LICENSE AGREEMENT

A. The Owner may be required to sign a copy of the Manufacturer's standard software and firmware licensing agreement as a condition of this contract. Such license shall grant use of programs and application software to Owner, but shall protect Manufacturer's rights to disclosure of trade secrets contained within such software.

PART 2 - PRODUCTS

2.01 GENERAL

A. The Environmental Control System shall be comprised of a network of various independent stand-alone Digital Controllers (SDC), Unitary Digital Controllers (UDC), together with Centralized Control Stations (CCS), interconnected in Local Area Networks (LAN).

B. Stand-Alone Digital Controllers (SDC)

1. General

   a. Stand Alone Digital Controllers (SDC) shall be 16 bit microcomputer based, providing a multi-tasking, multi-user operating system.

   b. The SDC controllers shall permit the simultaneous operation of control, communication and operator interface software as programmed by the Contractor or User. Modification of the on-board SDC controller database shall be performed on-line using the built-in keypad or a Portable Operating and Service Terminal (POST). Proposed substitution, which requires the SDC to be removed from service while control sequences are modified will not be acceptable.

   c. SDC controllers shall utilize true floating arithmetic capabilities.

2. Agency Approvals

   a. The SDC controllers shall be tested and approved by the manufacturer as conforming to FCC Part 15, Subpart J: Class A Compliance.

   b. SDC's applied to mechanical systems shall be UL listed or recognized under UL916 or UL873 for control of mechanical systems or temperature regulating systems.

3. Database and Memory Back Up

   a. Programming defining the function to be performed by the SDC, including but not limited to application programs and point database within each SDC, shall be protected from loss due to power failure for a minimum of six months. Systems providing nonvolatile memory shall include Battery back-up sufficient to provide protection for a six-month period.

4. Service Port

   a. SDC controllers shall be equipped with a minimum of one service port for the connection of a Portable Operating and Service Terminal (POST). The service port shall be either a built-in RS-232 data terminal port of RJ-11 type jack which connects to manufacturers standard POST.

   b. Connection of a POST to a service port shall not cause the SDC controller to lose communications with its peers or other networked device controllers.

   c. Connection of a POST to a service port shall allow communications with SDC's on that BUS, including modification of program variables and commands.

5. Service and Operator Interface

a. The cover of each SDC shall contain a built-in service and operator interface consisting of an alphanumeric two (2) line by 20-character LDC and multifunction keyboard. Using this interface at SDC's shall allow communications with SDC's on the BUS, including modification of program variables and commands.

b. Proposed substitutions which do not include a built-in service and operators interface shall include a Portable Operating and Service Terminal (POST) built into a panel mounted adjacent to each SDC.

c. The built-in service and operator interface shall allow adjustment of control parameters such as set points, throttling ranges, etc.

d. The SDC controller shall additionally provide diagnostic LED indication of device transmit and receive, data communications, normal operation, abnormal operation and control relay positive.

6. Manual/Auto Control and Notification

a. The SDC controller shall provide commanded software override capability from the POST or the built-in interface. Such overrides shall be enunciated to the CCS. Such overrides shall be valid as long as power is continuously applied to the controller or they are not changed from the CCS.

b. Manual service overrides such as Hand/Off/Auto switches shall be provided. Such overrides shall be located at the controlled device location and conform with OSHA manual lockout regulations as appropriate for safety reasons.

c. Proposed substitutions which include built-in H/O/A switching devices with integral feedback shall also include external manual service overrides as indicated to comply with OSHA manual lockout regulations.

7. Control Outputs

a. Each on/off output shall have an internal test point for the purpose of trouble shooting whether the 120 VAC circuit to the Contractor is active. Output relays or digital output modules shall have a pilot light or LED display of its status.

b. Modulating outputs shall be industry 0-5 VDC, 0-12 VDC, 0-20 mA or 4-20 mA. Drive open/drive closed type modulating outputs shall include feedback of commanded position signal to the actuating device. This feedback signal must provide either a 0-100 percent position indication, or read out directly in the engineering units of the signal being used. Proposed substitutions with drive open/drive closed type controllers shall include sufficient components and control algorithms to comply with this requirement.

C. Unitary Digital Controllers (UDC)

1. General

    a. Controls shall be microprocessor based, unitary air handling unit Direct Digital Controllers, UDC's shall be provided for air handling units, fan coil units, secondary chilled pumping loop systems and hot water heating system as shown on the drawings. UDC shall be based on a minimum 1 bit microprocessor working from software program memory, which is physically located in the UDC. The software control 'intelligence" shall be resident within the same enclosure as the circuitry which translates sensor signals into digital information.

    b. Provide a minimum of one UDC for each fan coil unit, air handling or mechanical system unless otherwise shown on the drawings. Fan coil UDC's shall have analog output to drive proportional heating and cooling control valves.

    c. The Control System Contractor shall furnish, install, calibrate, service and warranty UDC's specified under this section.

    d. Each UDC shall be in continuous direct communication with the CCS on the BUS.

2. Non-Volatile Memory

    a. Control sequences programmed into the UDC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery to be retained. Power failures shall not cause the UDC memory to be lost, nor shall there by need for batteries to be recharged or replaced.

    b. Control parameters shall be fully field modifiable at the UDC controller and from a CCS.

3. Ambient Rating

    a. To allow controller locations on unconditioned spaces, UDC's shall operate normally in ambient conditions from 40 ºF to 140 ºF (4 to 60 ºC).

    b. If the standard literature of proposed substitute controllers does not indicate normal operation up 140 ºF.

4. Room Sensors (Thermostats)

    a. Unless otherwise noted, temperature sensors located in conditioned spaces shall have blank, locking covers. Finish shall be manufacturer's standard, except where otherwise noted on drawings.

    b. Room sensors shall have space temperature and set point signal precision tolerance of no greater than 1 ºF.

c. ASHRAE 90 – 75 Compliance

1) Room temperature sensors shall be provided with software programmable dual set points. Dual set point devices shall be provided with an interlock which provide a programmable heat/cool deadband.

d. Occupant Override of Unoccupied Mode

1) Each room sensor for fan coil unit shall have an integral momentary push-button which can be depressed by an occupant during unoccupied mode of the unitary fan coil unit. This push-button shall cause the UDC to bring the unitary fan coil to occupied set points for one override period of a duration adjustable between 1 and 240 minutes. Should an occupant depress the push-button again, lager, UDC shall begin timing an additional override period. Override operation time shall be accumulated to allow generation of reports indicating override usage.

2) For cooling and heating system provide a 0 to 8 hour bypass timer on first floor.

e. Occupant Control

1) Occupants of the space served by the unitary fan coil units shall have adjustments integral to the room sensor allowing them to adjust local cooling/heating set points.

2) The above occupant control functions can be monitored, overridden and remotely modified by an operator with appropriate password level. Operators shall have access to these functions from standalone digital controller on the network having a built-in interface or via a plug in POST at wall sensor or device location on the BUS.

f. Service Port Connection

1) Unless otherwise shown, temperature sensors shall be provided with a plug-in RJ-11 type communications jack for connection to a POST. The communications jack shall be concealed under the cover to prevent tampering.

2) The same POST shall be connectable at wall sensor locations as well as other SDC and UDC device locations. Upon connection to a wall sensor, its corresponding SDC or UDC address shall be automatically displayed on the POST for the operator.

3) The connection of a POST at a wall sensor shall permit the operator to communicate with all other devices on the BUS.

4) The POST connection shall not cause the UDC or SDC through which the POST is connected to leave the communications network or generate an exception or be removed from service.

D. Centralized Control Station (CCS)

1. The system shall include Centralized Control Stations as shown. CCS's shall control communications with the SDC's and UDC's and serve as a centralized facility operator station providing facility wide access for review and modification of global control strategies and centralized documents.

2. A CCS shall support both a monochrome operator's terminal and serial printer. The CCS shall allow logging of alarms, trend logs, energy reports and review of specific facility information by operators.

3. The CCS shall not require a computer with RAM memory and disk storage for operation.

4. Operator Interface: Each CCS shall have built into its cover a data terminal consisting of a four line by 20 character LCD and a full alphanumeric key.

5. Operations

   a. The user shall penetrate the system via menu prompted commands. Data entry selection shall be via cursor keys or via keyboard entered command strings, which uniquely identify the command, the system shall provide a list of choices of user selection.

   b. The system shall provide logical groups of selected current point status for each SDC within the system.

   c. The system shall provide password protected logical system displays of selected variables, which may be changed by user with appropriate password level. A minimum of one display shall be provided per SDC in the system.

6. CCS Program Changes: Each CCS shall enable the operator to access controllers in the network.

7. Exception Log

   a. The CCS shall receive and output exception reports of device exceptions including alarms, diagnostic and facilities management exceptions.

   b. The CCS Exception Processing Program shall permit an operator to access an SDC exception log, and acknowledge alarms.

8. Report Generation

    a. The CCS shall produce reports of devices connected to the LAN, including module lists and module detail reports.

    b. The CCS shall produce SDC device exception reports to be output on demand by the operator.

9. Remote Site Communications: The CCS shall permit communication to remote sites via a 2400 baud modem. The user shall enter the site phone number causing the CCS to dial up the site and gain access.

E. Local Area Networks

1. Error Checking: The LAN shall utilize packetized transmissions, CRC 16 error checking and distributed error recovery. Single or multiple SDC or UDC failures shall not cause loss of communication between other LAN connected controllers still active.

2. Communication Watchdog: LAN-connected controllers shall be provided with a communications watchdog to assure that an individual controller cannot permanently occupy the LAN. If a controller is determined to be monopolizing communications, it shall be automatically shutdown and an exception reported to annunciate this fact.

3. Transmission Format: The Local Area Network shall utilize industry standard data transmission formats such as IEEE 802.3 (peer-to-peer) or ANSI X3.28. The content of messages shall be the manufacturers standard. The Local Area Network components shall be manufacturers standard or available from third party vendors, which utilize the same chip implementation as used by the manufacturer.

4. RS-485 Network Trunk System

    a. Wiring Practices

        1) The distributed communication network system shall consist of a multi-drop RS-485 bus architecture connecting SDC's and UDS's. The trunk shall consist of:

            (a) A twisted pair of wires (24 awg) completely encased in continuous metallic conduit.

            (b) or a twisted shield pair of wires (24 awg) with the shield grounded in accordance with the manufacturers wiring practices.

        2) There shall be no power wiring in excess of 40 VAC peak voltage run in conduit with communications trunk wiring. In cases where power or signal wiring is run in conduit with truck wiring, communication trunk

wiring and power wiring shall be run using separate twisted shield pairs (24 awg) with the shields grounded in accordance with the manufacturer's wiring practices.

b. Transient Protection: The manufacturer's catalog data sheet shall provide evidence that the manufacturer's SDC and UDC products are tested and comply with IEEE-587 Categories A and B (ANSI C62.41) standard for transient surge withstand capabilities for electrical devices. Such testing shall have included power and communication trunk wiring. Compliance with IEEE-587 shall imply conformance with IEEE-472 transient standards, as IEEE-587 is a higher energy level test.

F. Portable Operating and Service Terminal (POST)

1. Provide a laptop personal computer with manufacturer's standard software for use as a POST. It shall be battery powered and have a 120 VAC line adaptor. Provide network controller interface for connection to SDC's, CCS's and UDC's.

2. Device capabilities shall include an 8 line x 40 character LCD, full ASCII keypad, plug-in 128k byte RAM cards, library of manufacturer's interface software and serial/parallel interface adaptor.

3. The POST shall be provided with software which allows the operator to view, edit, modify, override or record sequences, schedules, set points and other parameters contained in SDC's and UDC's on the BIS by connecting the POST to a controller or temperature sensor.

G. Damper Actuators

1. Electric damper actuators shall be properly sized to provide sufficient torque to position the damper throughout its operating range. Pneumatic actuator operating in series or parallel to another actuator or open loop such as minimum percentage outside air shall be equipped with a positive positioning device.

H. Sensors

1. Sensing inputs shall be provided via industry standards signals. Temperatures, humidities, differential pressure signals and other signal outputs shall be one of the following types:

a. 0-20 mA

b. 4-20 mA

c. 0-5 VDC

d. 0-12 VDC

e. 1000 ohm platinum (at 0 ºF, 2.62 ohms/C)

f. 1000 ohm Balco (2.2 ohms/ ºF)

g. 10 ohm thermistor (at 25 ºC/77 ºF)

2. Signal inputs shall be compatible with the controllers used, and with the requirements for readouts of variables in true scaled engineering units as specified.

I. Motorized Control Dampers

1. Motorized dampers shall be parallel blade for two-position control and opposed blade for proportional control applications. Dampers shall be black enamel finish or galvanized, with nylon bearings. Blade edge and tip seals shall be included for dampers. Leakage through the damper shall not exceed 20 CFM per square foot at 4" w.g. (based on a 48" x 48" test sample). Blades shall be of welded channel iron. Dampers with both dimensions under 18" wide shall be equipped with a jack shaft to provide sufficient force throughout the intended operating range.

J. Variable Air Volume Terminal Unit Digital Controls

1. General:

a. Variable Air Volume Digital Controls (VAVDC's) shall be microprocessor based, variable air volume unit Direct Digital Controllers. Provide one VAVDC per variable air volume terminal unit. VAVDC shall be based on a minimum 16 bit microprocessor working from software program memory, which is physically located in the VAVDC. The software control "intelligence" shall be resident within the same enclosure as the circuitry, which translates sensor signals into digital information.

b. The control system Contractor shall furnish, calibrate, service and warranty VAVDC's specified under this section. Controls shall be mounted in factory by unit manufacturer.

c. Each VAVDC shall be in continuous direct communication with the CCS on the BUS.

2. Non-Volatile Memory:

a. Control sequences and parameters shall be fully field modifiable from a space sensor on the BUS and from the CCS or CHS.

3. Ambient Rating:

a. VAVDC's shall operate normally in ambient conditions from 40ºF to 140ºF.

4. Room Sensors:

    a. Temperature sensors located in conditioned spaces shall have blank, locking covers. Finish shall be manufacturer's standard, except where otherwise noted on drawings.

    b. Room sensors shall have space temperature and set point signal precision tolerance of no greater than 1ºF.

    c. Each room sensor shall be provided with a plug-in jack for the manufacturer's portable operators and service terminal (POST).

    d. To accommodate zones with multiple VAV terminal units, each room sensor/set point shall be capable of being connected simultaneously to up to four VAVDC's.

5. Compliance with Standards:

    a. To allow mounting in return air plenums, the VAVDC enclosure shall be constructed to comply with the requirements of UL 465.

    b. To comply with ASHRAE 90-75 room temperature sensors shall be provided with software programmable single or dual set points where indicated on the drawings. Dual set point devices shall be provided with an integral software interlock, which provides a programmable heat/cool deadband.

6. Occupant Control:

    a. Occupants of the space served by the variable air volume terminal shall have adjustments integral to the room sensor allowing them to adjust local cooling and/or heating set points.

    b. The above occupant control functions can be monitored, overridden and remotely modified by an operator with appropriate password level. Operators shall have access to these functions from a stand-alone digital controller on the network having built-in interface or via a plug in POST a wall sensor or device location on the BUS.

7. Service Port Connection:

    a. Temperature sensors shall be provided with a plug-in RJ-11 type communications jack for connection to a POST. The communications jack shall be concealed under the cover to prevent tampering.

    b. The same POST shall be connectable to wall sensor locations as well as other SDC, UDC and VAVDC device locations.

    c. The connection of a POST at a wall sensor shall permit the operator to communicate with other devices on the BUS.

d. The POST connection shall not cause the VAVDC, UDC or SDC through which the POST is connected to leave the Communications network or generate an exception or be removed from service.

8. Controller Pint Capacity:

a. Cooling Only Units:

1) The VAVDC controller shall provide input/output points as follows:

(a) Self-calibrated Velocity Pressure Input (0-2" WC). The velocity pressure transducer shall be a continuously self-calibrating unit, which determines the 0 velocity pressure point by equalizing the pressure across the sensing element every 10 – 15 seconds.

(b) Room Temperature Input.

(c) Occupancy Override Input.

(d) VAV Box Damper Output: Unless otherwise specified, the controller shall provide a minimum 30 lb. integral electric actuator having a 90 º stroke rotation time of 3 minutes maximum.

(e) Occupancy or Status Inputs.

(f) 0 – 100% Position Indication of Primary Actuator.

(g) Room Set Point Input.

(h) Auxiliary Temperature Input

(i) POST Interface.

## 2.02 SOFTWARE

A. General

1. Contractor shall provide software for a complete and operational system as described herein. Software shall include manufacturer's standard multi-tasking, multi-user operating system for operator consoles and controllers, network communication software for dial-up and hard trunk applications, operator man-machine interface software, control application software and other software necessary to provide the function specified herein.

2. System software shall be manufactured by the system manufacturer. Software products manufactured by outside vendors will not be acceptable.

B. Local Area Network Software and Operations

1. Network Shared Data: The system local area networks shall provide for the sharing of calculated and control point variable values throughout the network. The contractor shall provide network software links as necessary to provide a complete and functioning system.

2. Network Diagnostics

   a. The CCS System shall provide software utilities to determine the on-line status of network connected panels.

   b. If an SDC or UDC drops off-line, the network software shall detect and annunciate such conditions to the proper output devices.

3. Network Performance

   a. The communication networks shall provide end-to-end data transmission of necessary control point values at a minimum fate of that established by standard NFPA-90A for smoke control operation.

   b. The nominal network response speed for a data request entered at a man-machine interface for data contained in another panel shall not be greater than 30 seconds.

   c. Network failure (i.e., device on/off line) shall be self-recovering and not require a manual initiation of the network.

4. Segregation of Information Reporting: The network shall support the segregation of messages by class of data to groups of output devices. The network control software shall provide a minimum of 5 classes of segregation. One class of information may be sent to a group of multiple input/ output devices.

5. Multi-user Operations

   a. The network control software shall support the simultaneous operation of the system by multiple users (minimum of 5). Data requests from a operator shall be automatically routed and responded to using the token passing control methods of IEEE standard 802.3.

   b. SDC panels which originate alarm, maintenance or other information shall automatically have their messages routed to the appropriate device without operator intervention.

6. Distributed System Access

   a. Facility Wide Access: LAN connected CCS shall provide access to other LAN connected CCS's and their associated UDC units. Access shall be

supported both via the integral operator keypad and through locally connected Portable Operating and Service Terminal (POST).

b. Access Restriction: SDC's shall include integral devices with full alphanumeric display and a keypad for password controlled access to various levels of operation capability, from simple information access, to ful programmability of functions.

C. Stand Along Digital Controller (SDC) Software

1. Multi-Tasking: SDC operating system software shall be multi-tasking. The multi-tasking capability of the SDC shall provide the capability to simultaneously perform at least, but not limited to, the following functions:

a. Downloading of application program changes to the SDC without affecting the simultaneous operation of existing application programming.

b. Printing of scheduled or on-demand reports without preempting operator functions.

2. Standard Software Function Libraries

a. SDC's shall have as a standard feature of their system software, complete libraries of control algorithms for DDC, Energy Management, and Facilities Management functions.

b. These resident libraries of algorithms shall be drawn from for the creation of the application programming of each individual SDC.

c. Requests for substitution of controllers which provide customer application software via line-by-line programs shall not be acceptable unless source and complied program code is contained in totally non-volatile, but programmable EPROM firmware to facilitate the on-line modification of application control sequences.

d. The Contractor shall utilize these libraries to satisfy the sequences of operation specified herein. Requests for substitution of systems which create these programs utilizing line-by-line programming methods in languages such as PASCAL, BASIC "C" or similar shall include the cost of providing the Owner with fully annotated source code of application software modules used in a 10 year escrow of such source code in a third party location.

3. Read Out of Items

a. Items specified for read out shall be under polled or continuous display on the face of the panel with either a digital display or analog electronic meter. The system shall provide for a minimum of 20 values per SDC panel with displays as indicated in the locations shown on the drawings. Read out of sensed

variables used in control sequences shall be from the same sensors used for control.

b. Each read out item shall be individually named and labeled. Name label shall be directly adjacent to the actual display value of that item including the applicable engineering units. Label shall be a part of the digital display of that value, or a Bakelite label mounted directly above the value display. Display readout requirements are in addition to capabilities provided by Portable Operating and Surface Tool (POST), which are provided as part of digital controller-based systems.

4. Adjustments

a. Each SDC shall provide adjustments for the functions specified. In general, adjustments shall be provided for set points used by controllers within each control panel. In addition, adjustments shall be provided for throttling ranges, mixed air damper minimum positions, or other items as specified. Adjustments shall be made at each control panel. The method for adjustments shall be a dedicated adjustment pad or individual adjustment potentiometers providing direct input to the affected loop controller or sequence controller.

5. SDC Alarm Dial Out

a. The SDC system shall provide built-in software with capability to dial out an alarm up to 10 remote reporting locations.

b. Based on time of day or an event initiated program, the SDC software shall permit an alarm to select one of three dial up tables. Each table shall consist of a subset of the 10 phone numbers.

c. The alarm shall cause the selected table to dial out and report the alarm to phone numbers listed in the table selected.

d. Reporting of an alarm to only a single phone number in the table shall not be acceptable as it negates the need to notify the Owner and a service contractor and the person on call, if necessary.

6. Portable Operating the Service Terminal (POST)

a. General

1) The Contractor shall provide software for use on the POST. The POST software shall display commands and data entry templates using pop-out, English language menus.

2) The POST software shall allow the same POST to be connected to a device type on the controller network. Connection shall be via a

manufacturer's supplied cable interface for wall sensor locations and an RS-232 cable at SDC service port locations.

b. Access

1) The POST shall allow a user to access to UDC controllers to the BUS. The user shall be able to communicate with UDC controllers with or without a parent CCS on the BUS and to modify parameters, sequences, upload and download programs.

## PART 3 - EXECUTION

### 3.01 INSTALLATION AND SUPERVISION

A. Work described in this section shall be installed under the supervision of factory trained engineers and mechanics qualified for this work and in the regular employ of the system manufacturer's or system manufacturer certified contractor's field office. Engineering, programming, testing, calibration and check out shall be performed by employees of the system manufacturer's or system manufacturer certified contractor's field office.

### 3.02 APPLICATION SOFTWARE DOCUMENTATION

A. Contractor shall provide AutoCAD blueprint documentation of the software application program for each SDC. Documentation provided shall include blocks software flowchart showing the interconnection between each of the control algorithms and sequences. For systems utilizing program listings, a program listing shall be printed onto the same blueprint, along with the program flowchart, and description of the sequence of operation. This blueprint shall be stored and maintained in each SDC panel. System acceptance shall not be completed until this documentation is provided and located in each panel.

### 3.03 ACCEPTANCE TESTING

A. General:

1. The system contractor shall perform acceptance testing on the system to verify its correct operation. Although some test routines may be performed of the site, the owner shall be notified to al routine dates and places and be invited to have its employees or agents witness tests.

B. Acceptable Test Submittals

1. The system contractor shall submit for approval by the Architect an Acceptance Testing Manual which describes in detail each proposed test routine:

a. The purpose of the test routine.

b. The detailed procedure for the test routine.

c. The location of the test routine.

d. The forms to be completed during the test routine.

C. Test Routines

1. General

a. At least the following test routines shall be performed. Detailed test result forms shall be maintained. Their personnel performing each test routine shall certify the accuracy of the test results.

2. Engineering Review

a. The purpose of this routine is to verify that the appropriate hardware, programs, parameters and graphics have been chosen to comply with the plans and specifications.

b. This test will be performed by comparing the proposed equipment and programs with the project plans and specifications to ensure that required sequences of operation will be provided.

c. Documentation shall include detailed program and graphic names and parameters for each specific program.

3. Software Simulation

a. The purpose of this routine is to verify that new or revised sections of program code have been successfully debugged and shall operate according to the design standards.

b. This shall be performed by simulating inputs such as temperatures, pressures and binary inputs to each section of code and/ or function blocks and observing the actions of the programmed outputs.

c. Documentation shall include description of the test, simulated inputs, a record of the outputs and a certification that the section of program code performs the required tasks.

4. Database Download

a. The purpose of this routine is to verify that the software has been correctly downloaded to the hardware modules.

b. This shall be performed by observing that communication has been established with each module and the download is proceeding and after the download is completed observing that no errors have been reported.

c. A report shall be provided indicating the date that the software was loaded and the initials of the party performing the loading.

5. Module Communications

a. The purpose of this test is to verify that the wires from each input device are correctly terminated at the DDC module.

b. The test shall be performed by exercising (i.e. either opening or shorting the wires) each input device and observing the resultant change of state.

c. The forms for this test shall include the device name, the device hardware address, the date of the test and the initials of the individual performing the continuity test.

6. Input Accuracy

a. The purpose of this test is to calibrate the DDC reading to the actual value of the measured analog input.

b. This test shall be performed by measuring the actual analog input with an agreed standard, such as a digital thermometer, and calibrating the DDC reading to agree with this value.

c. The form for this test will include the following:

1) The name of the point.

2) The hardware address of the point.

3) The actual value read.

4) The correction of the DDC Systems' span and offset.

5) The initials of the person performing the test.

7. Output Continuity

a. The purpose of this test is to verify that the wires to each output device are correctly terminated at the DDC module.

b. This test shall be performed by activating each output at the DDC module and observing the resultant operation of the required field device.

c. The forms for this test shall include the device name, the device hardware address, the date of the test and the initials of the individual performing the continuity test.

8. Output Accuracy

    a. The purpose of this test is to calibrate the DDC software to the actual analog operating ranges of the modulating controlled devices.

    b. This test shall be performed by adjusting each DDC analog output through its entire output range and observing the points at which the controlled device begins its stroke and at which the controlled devices end its stroke.

    c. The form for this test shall include the following:

        1) The name of the point.

        2) The hardware address of the point.

        3) The beginning and ending points of the controlled device stroke.

        4) The date of the test.

        5) The initial of the person performing the test.

9. Alarm/Report Test

    a. The purpose of this test is to verify that required alarm and report functions are operational and will report to the chosen devices.

    b. The binary alarm test shall be performed by simulating the required alarm contract conditions at the DDC module digital input and observing that the corresponding alarm is annunciated at the correct devices.

    c. The analog alarm test shall be performed by adjusting the alarm limits such that the actual sensor value is outside of the limits and observing that the corresponding alarm is annunciated at the correct devices.

    d. The operator requested report test shall be performed by having the host operator request each report and observing that the correct report is displayed and/ or printed.

    e. The automatic report test shall be performed by simulating the circumstance that generates the report (i.e. time of day, end of month, etc., and observing that the correct report is displayed and/ or printed.

    f. Documentation shall include point name, report name, hardware address, date of test and the initials of the person performing the test. A hard copy of the alarm and report print out should be included where practical.

10. Control Loop Tuning Test

a. The purpose of this test is to verify that the software closed loop control functions operate correctly.

b. This test shall be performed by upsetting the loop (usually by hanging the set point) and observing that the controlled variable moves to the new set point without excessive cycling or delay.

c. Documentation shall include point name, report name, hardware addresses, calibration parameters, ie. proportial band, switching differential etc., date of the test and the initials of the person performing the test. Additional documentation such as trend or graphic logs shall be printed and included where possible.

11. Communication Test

a. The purpose of this test is to verify that information is correctly shared among DDC modules on the LAN.

b. This test will be performed by simulating the information to be shared i.e. the starting of or stopping of a fan or pump in another DDC module, and observing that the required action does not indeed occur.

c. Documentation shall include a description of the test and a certification that the communication functions operate correctly.

3.04 WARRANTY ACCESS

A. The Owner shall grant to the Contractor, reasonable access the system during the warranty period. The Owner shall provide at no cost to the Contractor, a dedicated voice grade telephone extension for remote telecommunication during this period.

END OF SECTION

# SECTION 16510

# LIGHTING FIXTURES

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

### 1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Lighting fixtures and accessories.
2. Lamps.
3. Ballasts and drivers.
4. Parking Lot Poles.

B. Related Work:

1. Section 16010 - Basic Materials and Methods.
2. Section 16111 - Conduit.
3. Section 16120 - Wire and Cable.
4. Section 16130 - Boxes.
5. Section 16450 - Grounding.

### 1.03 SUBMITTALS

A. Submit Shop Drawings.

B. Include outline drawings, lamp and ballast data, support points, weights, and accessory information for each lighting fixture type.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS - LIGHTING FIXTURES

A. See Lighting Fixture Schedule on drawings.

B. Indoor Lighting: Cree LED

C. Indoor Emergency Lighting: Cree LED; Battery back; Ballast to meet DSA lighting requirements.

D. Occupancy Sensor: Novitas; Super Switch 2-01-400; White; Automatic seld-adjusting wall switch; 120/277 VAC.

E. Occupancy Sensor: Novitas; 01-072; White; One way room.

F. Occupancy Sensor: Novitas; 01-083; White; Two way room.

G. Occupancy Sensor: Novitas; 13-051; White; Heavy duty switch pack.

2.02 FLUORESCENT LAMPS

A. Approved manufacturers

1. Osram Sylvania (“Sylvania” or “OSI”)

2. General Electric

3. Philips

B. Color temperature

1. All lamps shall be 4100k unless otherwise noted on drawings.

C. T-8 lamps

1. Nom. 4’ 32 watt, 3’ 25 watt, or 2’ 17 watt per schedule, do not use “energy saving” T-8 lamps.

2. 4’ lamps shall be rated at least 3150 initial lumens at 32 watts, GE “HL”, Sylvania “Xtreme” or Philips “Advantage”.

3. Minimum CRI 82 employing rare earth phosphors.

4. Low mercury type meeting federal “Tclip” standards.

5. All lamps from same manufacturer and batch.

D. Compact fluorescent lamps.

1. CF32: triple tube, amalgam, four-pin preheat start lamp, per schedule.

2. CF26: triple tube, amalgam, four-pin preheat start lamp, per schedule.

3. CF13: twin tube, four-pin preheat start lamp, per schedule.

4. Other lamps as scheduled.

5. All lamps from same manufacturer and batch.

2.03 FULL SIZE T-8 FLOURSCENT BALLASTS

A. Approved Manufacturers

1. Osram Sylvania
2. Advance
3. General Electric
4. Universal and Triad

B. Electronic, High Frequency Type

1. Unless otherwise noted, ballasts shall be “program start” type.
2. Instant start and dimming ballast need to be approved.
3. Electronic high frequency dimming ballasts specifically compatible with the control system being provided. The following are approved:
   a. For 0 – 10 volt DC control circuits only: Lutron ECO-10TV, Advance Mark VII, Universal Ballastar or Sylvania “Helios”.

C. Latest Generation “Efficient” Type meeting the following performance requirements. Ballast efficacy factor (BEF) is defined as ballast factor divided by ANSI input watts times 100.

| LAMPS | MINIMUM BEF WITH INSTANT START BALLASTS | MINIMUM BEF WITH RAPID OR PROGRAM START BALLAST |
|---|---|---|
| 1 F32T8 | NA | 2.84 |
| 2 F32T8 | 1.58 | 1.47 |
| 3 F32T8 | 1.04 | 0.97 |
| 4 F32T8 | 0.79 | 0.75 |

D. Ballasts and lamps shall be warranted for operation together for minimum 2 years warranty on lamps and 5 years on ballasts.

E. Power factor > 90%

F. Harmonic distortion < 20%

G. ANSI 82.11 color coded

H. Class a noise rated

I. Complying with FCC 47 cfr part 18 non consumer RFI/EMI standards.

J. Ballast per schedule as follows:

1. RLO = reduced light output, ballast factor 78% or less.

2. NLO = normal light output, ballast factor nominal 88%.

3. HLO = high light output, ballast factor nominal 120%.

2.04 HID BALLASTS

A. HID Ballast: Extra quiet type selected by luminaire manufacturer.

B. Ballast: Accessible from below.

2.05 LED AND DRIVERS

A. Comply with IES LM79 and LM80.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install lamps in lighting fixtures and lampholders.

B. Support surface-mounted lighting fixtures directly from building structure. Provide additional blocking, unistruts, steel channels, etc. as required.

C. Install recessed lighting fixtures with attached accessible junctions boxes to permit removal and access from below. Use plaster frames in plaster , gypsum wallboard or acoustic ceilings. In grid ceiling rated for light fixture support, support recessed fluorescent light fixtures directly from T-bar using approved earthquake clips and in addition, 2 No. 12 wires (slack wires), one at each diagonal end of fixture attached directly to a structural member. If two opposite ends of a fixture do not rest on ceiling main runners, provide 4 No. 12 wires (support wires) to structural member. In grid ceiling not rated for fixture support, attach fixture to grid using approved earthquake clips and in addition 4 No. 12 support wires directly to structural member.

E. Provide safety chain between fixture and structure for recessed light fixtures. Mount hanger channels to span structural and/or T-bar ceilings.

E. Provide required backing for all lighting fixtures.

F. Join continuously mounted fixtures by use of chase nipples.

G. Provide spacers where required.

H. Mount light fixtures so that fixture labels are not visible when viewed from below.

I. For recessed fixtures in fire rated ceiling, provide fireproofing enclosure equal to rating of ceiling.

J. Mount Parking Lot Poles complete with luminaires and lamps on concrete base.

K. In each pendant of a pendant mounted light fixture, provide a safety wire or cable attached to

the fixture and structure at each support capable of supporting four times the supported load. Provide swivel mounts at ceiling and longitudinal sway mounts at fixtures to allow fixtures to swing freely a minimum of 45 degrees from vertical.

L. Test motion sensors and daylighting controls.

M. For all dimming systems, contractor is responsible for burning in all lamps for 100 hours. Lamps are to operate at full output for this period.

N. Contractor is responsible for setting up and adjusting all control devices per the manufacturer's adjustments and resulting performance.

3.02 TESTS

A. Immediately before turning completed job over to Owner, clean all light fixtures inside and out, including plastics and glassware, adjust and tighten all trim, replace broken or damaged parts, lamp and test fixtures for electrical and mechanical operation. Replace all inoperative lamps, ballasts and other inoperative equipment.

B. Replace noisy ballasts immediately.

END OF SECTION

# SECTION 16720

# FIRE ALARM SYSTEM

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

### 1.02 WORK INCLUDED

A. Section Includes:

1. The work under this section includes labor, material, equipment, supplies, labor, testing, and accessories required to furnish and install a complete Fire Alarm System as indicated on the drawings and as specified herein.

2. It is the intent of the Drawings and Specifications for the Contractor to provide and install a complete, fully operational, and tested system.

3. All miscellaneous system components including, but not limited to control panels, digital communicator, alarm detection devices, alarm initiation devices, alarm indicating devices, remote power supplies, terminal cabinets, terminal blocks, conduits, wires, programming, testing, etc, as well as any other related items, shall be furnished and installed complete under this section, such that the system shall perform all functions listed herein in compliance with all of the specified requirements.

4. The complete installation shall conform to the following codes:

   2013 California Building Code (CBC).

   2013 California Electrical Code (CEC).

   2013 California Mechanical Code (CMC).

   2013 California Plumbing (CPC).

   2013 California Fire Code (CFC).

   2013 California Referenced Standards Code, Part 12, Title 24 C.C.R.

B. Related Sections:

1. Section 16010: Basic Materials and Methods.

2. Section 16111: Conduit

3. Section 16120: Wire and Cable

4. Section 16450: Grounding

1.03 SYSTEM REQUIREMENTS

A. Fire detection system shall continually supervise and monitor the following initiating, signaling, and monitoring circuits:

1. Manual fire-pull stations.

2. Smoke and heat detectors.

3. Fire sprinkler flow and tamper switches including PIV tamper switches.

4. Alarm signaling circuits including alarm, horns and visual alarm units.

5. Annunciators.

6. Power supplies and batteries.

7. Interconnection with HVAC system and kitchen fire suppression system.

B. System controls shall be UL listed for power limited applications in accordance with California Electrical Code.

C. The fire alarm devices and equipment shall be listed for installation for the fire alarm control panel to which they are being connected.

D. Complete installation shall conform to the version of NFPA 72, California Fire Code, California Building Code (CBC), and California Electrical Code (CEC) as approved by DSA on stamped drawings.

E. System labels and devices programming addresses shall be based on final signage and building labeling submittals.

1.04 CERTIFICATION

A. Certification: Installation of fire alarm system shall not begin until Shop Drawings, including State Fire Marshal listing numbers of fire alarm components, are submitted and reviewed by the Architect. Written certification by fire alarm equipment distributor or manufacturer shall be submitted to the Architect stating that system and its component parts are as approved and listed by the State Fire Marshal, and that the design conforms to requirements set forth in CBC.

1.05 PERFORMANCE

A. System shall be fully programmable, configurable, and expandable in the field without special tools or PROM programmers and shall not require replacement of memory ICs. Installer shall provide a CD of all system installed software, site specific system programming and all information and tools required to re-program or modify the system.

1.06 SYSTEM FUNCTIONAL OPERATION

A. When a fire alarm condition is detected by one of the system alarm initiating devices, the following functions shall occur:

1. System alarm LED shall flash.

2. Local sounding device in panel shall be activated.

3. The LCD display shall indicate type of device, custom label location label and point status alarm condition.

4. Appropriate change of status message shall be transmitted to remote annunciator(s).

4. Automatic programs assigned to alarm point shall be executed and associated indicating devices and relays activated.

6. UDACT (Universal Digital Alarm Communicator Transmitter) shall activate.

B. Trouble and Supervisory Conditions.

1. When any trouble condition is detected the following functions shall occur:

a. System trouble LED shall flash.

b. Local sounding device in panel shall be activated.

c. The LCD display shall indicate the type of trouble and custom label location associated with the trouble condition and its location. Unacknowledged alarm messages shall have priority over trouble messages. If such an alarm is displayed, then trouble messages shall not be displayed.

d. Appropriate message shall be transmitted to remote annunciators.

e. UDACT shall activate.

2. When any supervisory condition occurs such as a sprinkler valve tamper, the following function shall occur:

a. System supervisory LED shall flash.

b. Local sounding device in panel shall be activated.

c. Appropriate message shall be transmitted to remote annunciators.

d. UDACT shall activate.

B. Activation of control panel ACKNOWLEDGE switch in response to a single new alarm, trouble or supervisory condition shall silence panel sounding device and change system alarm, trouble, or supervisory LED from flashing to steady-ON. If additional new alarm, trouble, or supervisory conditions exist in the system; activation of this switch shall advance display to next alarm, trouble, or supervisory condition that exists, and shall not silence local audible device or change LED to steady until new conditions have been so

acknowledged. New alarm conditions shall always be displayed before new trouble conditions. Occurrence of a new alarm, trouble, or supervisory condition shall cause panel to resound, and sequences as described above, shall repeat.

C. Activation of the signal silence switch shall cause appropriate notification (indicating) appliances and relays to return to normal condition. Selection of notification appliance circuits and relays silenced by this switch shall be fully programmable.

D. Activation of system reset switch shall cause electronically latched initiating devices or zones, as well as associated output devices and circuits, to return to normal condition after sixty seconds of alarm. If alarm conditions exist in system after system reset switch activation, system shall then re-sound alarm conditions as indicated hereafter.

E. Activation of lamp test switch shall turn on LED indicators, LCD display, and local sounding device in panel, and then return to previous condition.

F. Fire alarm indicating appliances may be silenced, after one minute, by operating signal silence switch at the FACP or by use of key supervised alarm silence switch at remote annunciators. A subsequent zone alarm shall reactivate signals. Fire alarm indicating appliances shall be automatically silenced after 4 minutes of operation; visual indicating appliances shall be extinguished at system reset or automatically after 4 minutes of operation. Fire sprinkler flow alarm bells shall not silence until the contacts in the fire sprinkler flow switch return to the normal non-alarm state. Appropriate signage must be installed on or next to the sprinkler alarm bell.

G. Initiation and indicating circuits shall be monitored for open/short circuit and ground fault conditions, these conditions shall be indicated on the Fire Alarm Control Panel and Annunciator displays while remaining circuits continue to operate normally.

H. All notification appliance circuits shall be silenceable for testing purposes by authorized persons. Protected pass-codes, keys, or another secure method that does not require entering into the system programming shall be used.

1.07 POWER REQUIREMENTS

A. The fire alarm control panel and remote power supply shall receive 120 VAC power, 60 Hz, through a dedicated 20 amps circuit. Circuit breaker protection for the dedicated fire alarm power circuits shall be equipped with a handle lock-on device, the breaker handle shall be colored red and labeled “FIRE ALARM”. Clearly label the Electrical panel name, location and circuit number on the inside of the fire alarm control panel and all remote power supplies using a p-touch style labeling system. Transient voltage surge suppression shall be provided at the 120VAC input terminal.

B. System shall be provided with sufficient battery capacity to operate entire system upon loss of normal 120 VAC power, in a normal quiescent mode, for a period of 24 hours with 5 minutes of alarm indication at end of this period. System shall automatically transfer to standby batteries upon power failure. Battery charging and recharging operations shall be automatic. Batteries, once discharged, shall recharge at a rate to provide a minimum of 70 percent capacity in 12 hours.

C. Circuits requiring system operating power shall be 24 VDC and shall be individually protected at control panel.

## 1.08 SUBMITTALS

A. Component Plan Submittal: Availability and listing for its application shall be verified for all system components before presentation of the submittal. Include the following information and details as applicable:

1. Installer name, address, telephone number.

2. List of system components, equipment and devices, including manufacturer model numbers, quantity and California State Fire Marshal listing numbers, mounting heights, and symbols per LAUSD symbol list.

3. Copies of manufacturer specification sheets for equipment and devices indicated. Highlight or identify the specific components on Catalog cut sheets.

4. Voltage Drop Calculations: Include the following information for the worst case:

   a. Point-to-point or Ohms law calculations.

   b. Zone used in calculations.

   c. Voltage drop percent. Voltage drop shall not exceed manufacturer's requirements. If voltage drop exceeds 10 percent, indicate manufacturer listed operating voltage ranges for equipment and devices.

5. Battery types, amp hours, and load calculations including the following:

   a. Normal operation: 100 percent of applicable devices for 24 hours to equal control panel amps plus list of amps per device that draw power form the panel during standby power condition including, but not limited to, zone modules, detectors and devices as identified.

   b. Alarm condition: 100 percent of applicable devices for 5 minutes to equal control panel amps plus list of amps per device that draw power from panel during alarm condition including, but not limited to, the following:

      (1) Zone modules.
      (2) Signal modules.
      (3) Detectors.
      (4) Signal devices.
      (5) Annunciator.
      (6) Other devices as identified.

   c. Normal operation plus alarm operation load calculation shall include total amp hours required and total amp hours provided.

6. Provide one copy of testing procedures.

B. Shop Drawings: Provide Shop Drawings, in the same size as the design Drawings, Shop Drawings shall include the following:

1. Provide drawing scale, elevations of all system enclosures, and actual layout of the Fire Alarm Control Panel, power supply, annunciator, and all main system components.

2. Site Plan indicating PIV and all related fire sprinkler system devices and equipment to be monitored or supervised; such as water flow valves, and main equipment such as control panels, power supplies, annunciators, and components such as outdoor wall-mounted horns, sprinkler bells, pull boxes, underground pull boxes, wiring routes on buildings exterior and underground locations. In each conduit or raceway run indicate conduit sizes, and quantities and type of wires.

3. Complete battery calculations, and voltage drop calculation shall be included; these calculations shall be based on the devices maximum UL current rating.

4. One line drawing for the entire system network indicating all system components and wiring. The one line diagram shall show but not be limited to panel to panel interconnections, conductors gauge and quantity, conduit size and type (designation) and specific function.

5. System panel one-line drawings indicating the quantity and type (designation) of conductors entering and exiting the fire alarm terminal cabinet in each building (enclosure) for initiating, notification, or other command control functions required for complete system operation:

    a. Individual floor/building plan view drawings indicating all device locations including end of line resistors “EOLR” in accordance with the legend provided.

    b. Individual point addresses for all initiation and notification devices.

    b. Device “typical” wiring diagrams. These drawings shall indicate specific termination details for all peripheral equipment and/or interface devices.

6. Provide interfacing with equipment furnished by others including voltages, and other required coordination items.

7. Each of the pictorial diagrams included shall appear identical to the products they are intended to depict, in order to speed installation of the system, and to enhance the accuracy of the installation Work. Typical wiring diagrams or catalog sheets are not permitted.

8. Background Drawings with device locations of DSA approved drawings are available in electronic format and may be obtained from the Owner Authorized Representative (OAR). Contractor is solely responsible for the accuracy and completeness of shop drawings. Buildings that are not part of the contract shall be clearly identified “NOT IN CONTRACT”. Shop Drawings shall be prepared in the latest version of AutoCAD with 3 – CD ROM electronic copies submitted along

9. Other installation and coordination drawings specifically related to this section shall be included as follows:

    a. Size A (8-1/2 inch x 11 inches) and size B (11 inch x 17 inch) shall be bound into the manual.

b. Larger drawings shall be folded and inserted into transparent envelopes and bound into the manual.

10. Installation and coordination drawings for items in other sections shall be included with submittal of Shop Drawings. Submit blue line copies and one reproducible copy of installation and coordination drawings.

11. Samples: Provide Samples of material and equipment as required by the Architect. If Samples are requested, they shall be submitted within 10 days from date of request.

C. In addition to the above requirements, provide submittals to meet any additional requirements of DSA.

1.09 QUALITY ASSURANCE

A. Installer shall have successfully completed at least 5 projects of equal scope in the past 5 years, and have been in business of furnishing and installing fire alarm systems of this type for at least 5 years.

B. Installer shall be a factory authorized distributor and service provider for the brand of equipment offered and shall provide documentation to the Architect upon request.

C. Installer shall maintain a fully equipped service organization capable of furnishing repair service to the equipment and shall maintain a spare set of major parts for the system at all times.

D. Installer shall furnish a letter from manufacturer of equipment certifying equipment has been installed according to factory standards and that system is operating properly.

E. Certifications: Installer shall submit certification from the equipment manufacturer indicating that installer is an authorized representative of the equipment manufacturer and is trained on network applications.

F. All materials and equipment installed shall be new.

F. All of the equipment in this specification shall be furnished and installed by the Authorized Factory Distributor of the equipment. Furnish a letter from the manufacturer of all major equipment, which certifies that the installer is an authorized distributor and that the equipment has been installed according to factory intended practices. Furnish a written guarantee from the manufacturer that they will have a service representative assigned to this area for the life of the equipment.

G. Contractor/Installer’s electricians and fire/life safety technicians shall be certified in accordance with Labor Code sections 3099, and 3099.2, and section 209.0 of the California Code of Regulations.

H. System startup and testing shall be performed under the direct observation of the IOR and OAR. The Contractor at this time shall provide a legible half size reproduction of the original completed fire alarm red-line drawings (this copy will be retained by the Owner), an accurate copy of the fire alarm system points list, and a copy of the construction drawings on CD in AutoCad format,

I. Provide and install the most current software package available at the time of installation. At the time of Owner Acceptance of the installation, all equipment, including any and all updated software which is to include the appropriate operating system, pass-codes, electronic keys and program disks, manuals and cables employed in the installation of the system, shall be delivered to the OAR who will, in turn, forward the items to the appropriate maintenance area Electrical Department. In addition, when the programming software is available in disk format, a backup copy of the most up to date revision, in disk format, shall be delivered to the OAR at the completion of the project. A software license agreement shall be made available for the responsible Owner representative to sign at the time of training.

1.10 WARRANTY

A. The Fire Alarm Equipment Manufacturer shall provide a 3 year material warranty. Installer shall provide a 3 year labor warranty.

B. Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacturer for a period of 5 years after expiration of the warranty.

PART 2 - PRODUCTS

2.01 PTABLE MANUFACTURERS

A. re alarm equipment shall be standard products of the Silent Knight Farenhyt Series. Deviations from intended functions of specified system are not permitted. Equipment shall not be ordered or installed until such equipment has been reviewed and approved by the Architect.

2.02 ALARM CONTROL PANEL (FACP) OR NETWORK NODES

A. rnish Silent Knight IFP-2000 Fire Alarm Control Panels as indicated on drawings.

B. erator Control:

1. knowledge Switch: Activation of control panel acknowledge switch in response to a single new trouble or alarm condition shall silence panel sounding device and change system alarm or trouble LED from flashing to steady-ON. If additional new alarm or trouble conditions exist in system, activation of this switch shall advance display to next alarm or trouble condition that exists, and shall not silence local audible device or change LED to steady until new conditions have been so acknowledged. New alarm conditions shall always be displayed before new trouble conditions. Occurrence of a new alarm or trouble condition shall cause panel to resound, and sequences as described above, shall repeat.

2. gnal (Alarm) Silence Switch: Activation of the signal silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.

3. arm Activate (Drill) Switch: Alarm activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.

4. stem Reset Switch: Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zone, as well as all associated output devices and circuits, to return to their normal condition.

5. mp Test Switch: Switch shall activate all local system LEDs, light each segment of the liquid crystal display and display the panel software revision for service personnel.

C. stem Capacity and General Operation

1. e control shall provide, 636 Intelligent/addressable devices.

2. e control panel shall include Form-C alarm, trouble, supervisory, and security relays rated at a minimum of 2.0 amps @ 30 VDC. It shall also include four Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable Notifications Appliance Circuits.

3. e system shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color coded system status LEDs, and an alphanumeric keypad with easy touch rubber keys for the field programming and control of the fire alarm system.

5. The system shall be programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes.

6. The system shall allow the programming of any input to activate any output or group of outputs. The FACP shall support up to 20 logic equations, including “and” “or” and “not”, or timed delay equations to be used for advanced programming. Logic equations shall require the use of a PC with software utility designed for programming.

7. The FACP node shall provide the following features:

a. Drift compensation to extend detector accuracy over life. Drift Compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.

b. Detector Sensitivity test, meeting requirements of NFPA 72 Chapter 7.

b. Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.

c. Nine sensitivity levels for alarm, selected by detector. The alarm level range shall be .5 to 2.35 percent per foot for photoelectric detectors and 0.5 to 2.5 percent per foot for ionization detectors. The system shall also support sensitive advance detection laser detectors with an alarm level range of .03 percent per foot to 1.0 percent per foot. The system shall also include up to nine levels of

Pre- alarm, selected by detector, to indicate impending alarms to maintenance personnel.

d. Circuit boards, programming, and interconnecting cables to enable the system to display or print system reports.

e. Alarm verification, with counters and a trouble indication to alert maintenance personnel when a detector enters verification 20 times.

g. PAS pre-signal, meeting NFPA 72 requirements.

h. Rapid manual station reporting (less than 3 seconds) shall meet NFPA 72 Chapter 1 requirements for activation of notification circuits within 10 Seconds of initiating device activation.

i. Periodic detector test, conducted automatically by the software.

j. Self optimizing pre-alarm for advance fire warning, which allows each detector to learn its particular environment and set its pre-alarm level to just above normal peaks.

k. Cross zoning with the capability of counting: two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.

l. Walk test, with a check for two detectors set to same address.

m. Control-by-time for non-fire operations, with holiday schedules.

n. Day/night automatic adjustment of detector sensitivity.

o. RS 232 serial port to support a District supplied printer to be used for silent testing and certification of the system.

7. The FACP shall be capable of coding main panel(s) node notification circuits in temporal code (NFPA 72 A-2-2.2.2).The panel shall also provide a coding option that will synchronize specific strobe lights designed to accept a specific “sync pulse”.

D. stem Display

1. e display shall provide all the controls and indicators used by the system operator:

a. The display shall include the following operator control switches: Acknowledge, Alarm, Silence, Alarm Activate (drill), System Reset, and Lamp Test.

2. e display shall annunciate status information and custom alphanumeric labels for all intelligent detector, addressable modules, internal panel circuits, and software zones.

3. e display shall provide Light-Emitting-Diodes (LEDs) that indicate the status of the following system parameters: AC Power and Network Communication, Fire Alarm, Pre alarm Warning, Security Alarm, Supervisory Event, System Trouble, Alarm Silence, Disabled Points, CPU failure.

4. e display shall use “soft” keys for screen navigation or to accomplish dedicated programming functions. Full programming access shall require use of a laptop and the proper programming utility. The programming utility shall be provided to the OAR who will forward it to the local maintenance area representative.

5. e system shall support the display of battery charging current and voltage on the LCD display.

E. gnaling Line Circuits (SLC)

1. U shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, pre-alarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector’s desired sensitivity level by adjusting for the effects of environmental factors including the accumulation of dust in each detector. The analog information shall also be used for automatic detectors testing and for the automatic determination of detector maintenance requirements.

F. closures:

1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer’s standard finish.

2. The back box and door shall be constructed of 0.030 steel with provisions for electrical conduit connections into the sides and top.

3. The supplied door shall include a key lock and shall include glass or other transparent opening for viewing of all indicators. For convenience, the door may be site configured for either right or left hand hinging.

G. wer Supply:

1. off-line switching power supply shall be available for the fire alarm control panel and provide power for control panel and peripheral devices.

2. ovisions shall be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.

3. er-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger. Battery arrangement may be configured in the field.

4. e power supply shall continuously monitor all field wires for earth ground conditions, and shall have the following LED indicators:

a. Ground Fault LED

b. AC Power Fail LED

c. NCA-2 on LED (4)

5. e main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP or network node(s).

6. e main power supply shall provide a battery charger using dual rate charging techniques for fast battery recharge and be capable of charging batteries up to 60 AH for the NFS-640.

2.03 TE ANNUNCIATORS

A. ovide an alphanumeric display remote annunciator. Provide the following functions:

1. ntrol switches for system acknowledge, signal silence and system reset via a touchpad.

2. me/date display field.

3. cal piezo sounder with alarm/trouble resound.

4. -line green LED (flashing).

5. acuation/drill switches, via a touchpad.

6. e-signal hold via a touchpad.

7. stem test at control panel and CTR.

B. llowing additional features shall be furnished:

1. vice Fire Annunciation.

2. vice Trouble Annunciation.

3. stem Operation Annunciation.

4. ower On" LED.

B. Typewritten operating instructions and a site map shall be posted adjacent to all remote annunciator(s). The site map shall be sized and include all designations and devices as described in section 3.02 N. of this specification. Project site map shall depict all fire alarm devices in the building(s) in which they are installed. The instruction and site map shall be mounted in suitable document frames and attached to the wall with a minimum of two screws each. Contractor’s name and telephone number shall not be placed on either the instruction or the site map.

2.04 R SUPPLIES

A. it shall be furnished with main printed circuit board, transformers, lockable cabinet, and batteries. Unit shall be configured to drive 4 notification appliance circuits. The remote power supplies shall be configured with a monitor module to report trouble conditions to the controlling FACP via an SLC. Triggering of NAC inputs shall be directly controlled from the FACP without the use of addressable control or relay modules.

## 2.05 PHERAL DEVICES AND EQUIPMENT

A. nual Stations:

1. terior Use: Station shall be addressable semi-flush, non-breakable glass type. Station housing shall be fabricated of die-cast aluminum with reset lock and key.

B. oke Detectors: Smoke Detectors shall be addressable smoke detectors. Detector shall be microprocessor based, using a combination of photoelectric, and thermal sensing technologies. The smoke detector shall have its loop number and electronic address permanently and clearly labeled onto the device base using a p-touch type labeling system. The label shall be visible without removing the detector head.

C. tomatic heat detectors shall be combination rate-of-rise and fixed-temperature type. When fixed-temperature portion is activated, units shall provide visual evidence of such operation (LED). The location of the heat detector must be clearly marked below the ceiling and the detector must be readily accessible. The heat detector shall have its electronic address permanently and clearly labeled onto the device and be readily accessible. For spaces where the normal ambient temperature can reach temperatures as high as $150^0$ F. such as in attic spaces, use Notifier FST-851H with base B-710LP. The heat detector shall have its loop number and electronic address permanently and clearly labeled onto the device using a p-touch labeling system. The label shall be visible without removing the detector head.

D. nitor Modules:

1. dule shall connect a supervised zone of conventional initiating devices, N.O. dry contact devices, including 4-wire smoke detectors, to one of SLC loops. Monitor module shall install in a 4-inch square by 2-1/8 inch deep electrical box. The module shall have its loop number, electronic address, and function label on the front cover using a p-Touch type labeling system.

2. nitor module shall provide address-setting means using rotary decimal switches and shall store an internal type of device. An LED shall be provided which shall flash under normal conditions indicating that monitor module is operational and in regular communication with control panel.

E. ntrol Modules:

1. dule shall be used to connect a conventional indicating appliance or MR type isolation relay to one of the SLC loops. Control module shall install in a standard 4-inch square by 2-1/8 inches deep electrical box. Audio/visual/relay power shall be provided by a separate loop from main control panel or from supervised remote power supplies. The module shall have its loop number, electronic address, and function label on the front cover using a p-Touch type labeling system. Provide and install System Sensor Model A77-716B or equal power supervision relay to monitor 24 volt DC power.

2. ntrol module shall provide address-setting means using rotary decimal switches and shall store an internal identifying code which control panel shall use to identify type of device. An LED shall be provided which shall flash under normal conditions,

indicating that control module is operational and in regular communication with control panel.

F. lay Modules:

1. e module shall have its loop number, electronic address, and function label on the front cover using a p-Touch type labeling system.

2. controlled circuit exceeds the voltage or current rating of the relay module an Air Products and Controls MR-100 series relay shall be provided and installed. A System Sensor Model A77-716B or equal power supervision relay shall be provided and installed with each relay module that is controlling an isolation relay not configured in a fail safe mode.

G. olator Modules:

1. dule shall isolate wire-to-wire circuits on an SLC loop in order to limit number of other modules or detectors that are incapacitated by short circuit fault. If a wire-to- wire short occurs, isolator shall automatically open-circuit SLC loop. When short is corrected, isolators shall automatically reconnect isolated section of SLC loop.

2. olator module shall not require address setting, although isolators will electrically reduce capacity of loop by 2 detectors or module addresses. Isolator module will install in a standard 4-inch deep electrical box. It shall include a single LED that shall flash to indicate that isolator is operational and shall illuminate steadily to indicate that a short has been detected and isolated.

I. Horns and Strobes: All horns and strobes shall be products of the same manufacturer. In order to establish a standard of quality, items are specified from the products manufactured by System Sensor, acceptable manufacturers are Honeywell, Wheelock Inc., Gentex or District approved equal.

1. Alarm horns shall be polarized and operated by 24 VDC. Entire unit shall be red finish. Horn assemblies shall be furnished with separate wire leads for in/out wiring for legs of associated signal circuits. T tapping of signal device conductors to signal circuit conductors is not permitted. Suitable gaskets shall be provided for weatherproof installation. Horns shall provide a minimum sound pressure level of 100 dB at 10 feet. Horns shall be mounted on manufacturer’s recommended outlet boxes.

2. Horn/strobe shall be wall mounted. Horn/strobe shall operate on two separate 2 wire 24 VDC polarized circuits and shall be provided with a semi-flush mounting plate. Entire unit shall be red finish. Strobe light shall have a clear Lexan lens. The word "FIRE" shall be printed on the 2 sides of the strobe body. Horn shall provide a minimum sound output of 100 dB at 10 feet. The strobe shall provide a selectable minimum light intensity of 15, 30, 60, 75, 90, 110, 135, 150, or 185 Candela as indicated on Drawings to meet or exceed requirements of ADA and UL 1971. Horn/Strobes shall be mounted on manufacturer recommended outlet boxes.

3. Strobe indicating appliances Sensor Model No. SR standard candela output or shall be UL listed and shall be wall-mounted. Entire unit shall be red finish. Strobe light shall have a clear Lexan lens. The word "FIRE" shall be printed on two sides of the

strobe body. Strobes shall meet ADA and UL 1971 requirements. The strobe shall provide a selectable minimum light intensity of 15, 30, 60, 75, 90, 110, 135, 150, or 185 Candela as indicated on the Drawings to meet or exceed requirements of ADA and UL 1971. Strobes shall be mounted on manufacturer recommended outlet boxes.

4. Strobe synchronization modules if required shall be installed in conjunction with two or more strobes located in same room or corridor or as indicated on Drawings. (Strobe synchronization modules must be compatible with installed strobes)

J. Universal Digital Alarm Communicator Transmitter shall be provided. The UDACT is an interface for communication of digital information between a fire alarm control panel and a UL-Listed central station.

1. The UDACT shall be compact in size, mounting in a standard module position of the fire alarm control cabinet. Optionally, the UDACT shall have the ability for remote mounting, up to 6000 feet from the fire alarm control panel. The wire connections between the UDACT and the control panel shall be supervised with one pair for power and one pair for multiplexed communication of overall system status.

2. The UDACT shall include connections for dual telephone lines (with voltage detect), per UL/NFPA/FCC requirements. It shall include the ability for split reporting of panel events between up to three different telephone numbers.

3. It shall be completely field programmable from a built in keypad or laptop computer, and shall be capable of transmitting events in multiple formats.

4. Communication shall include vital system status such as:

   a. Independent Zone (Alarm, trouble, non-alarm, supervisory

   b. Independent Addressable Device Status

   c. AC (Mains) and Earth Fault

   d. System Off Normal

   e. 12 and 24 Hour Test Signal

   f. Abnormal Test Signal (per UL requirements)

   g. EIA-485 Communications Failure

   h. Phone Line Failure

4. The UDACT shall support independent zone/point reporting when used in the Contact ID format. This enables the central station to have exact details concerning the origin of the fire or response emergency.

5. The UDACT shall be supplied with two eight conductor, 2 to 6 foot long line cords. One end of the cords shall plug into the jacks on the UDACT. The other end of the cords shall plug into industry standard RJ-31X surface mounted telephone jacks. Install jacks in a screw cover box adjacent to the FACP if sufficient space is not

available within the FACP, or adjacent fire alarm terminal cabinet. The line cords shall be installed in conduit when it is necessary to locate the jacks remotely from the FACP enclosure. The jacks shall be mounted to the rear of the box. The telephone number for each line shall be labeled on its respective jack.

K. Network Cables/SLC/Annunciator Data/Audio Output Cables: The construction and physical characteristics such as aqua-seal water block, wire gage, insulation and jacket types, etc. shall not be altered. Equivalent cables must be specifically approved and recommended by the manufacturer of the fire alarm system equipment. Any and all substitutions will require approval from the Architect/Engineer of Record.

1. Indoor Network and EVAC System Audio Output Circuit(s) applications shall be in conduit or in surface mounted raceway as indicated on drawings: West Penn No. D980, one pair 18 gage solid copper, unshielded, copolene II insulated and PVC jacketed, or approved equal.

2. Indoor SLC applications in conduit or in surface mounted raceway where it is indicated on drawings: West Penn No. D990, one pair 16 gage solid copper, unshielded, copolene II insulated and PVC jacketed, or approved equal.

3. Indoor Annunciator applications in conduit or in surface mounted raceway where it is indicated on drawings: West Penn No. D975, one pair 18 gage solid copper, shielded, copolene II insulated and PVC jacketed, or approved equal.

4. Outdoor/Underground Network Applications: West Penn AQ224, 2-conductor 18 gage stranded copper, unshielded, water-blocked construction and PVC insulated, or approved equal.

5. Outdoor/Underground SLC applications: West Penn AQ225, 2-conductor 16 gage, AQ226, 2 conductor 14 gage, or AQ227, 2 conductor 12 gage stranded copper, unshielded water-blocked construction and PVC insulated, or approved equal.

6. Outdoor/Underground Annunciator applications: West Penn AQ293, 2 conductors, 18 gage stranded copper, shielded water-blocked construction and PVC insulated, or approved equal.

The above cable types are based and specified on the recommendations and approval of Notifier Fire Alarm Systems. If the submitted and approved fire alarm system requires a different cable configuration with additional conductors, multi-conductor versus twisted pairs, etc. than is specified above, the contractor shall request a substitution to supply and install the approved configuration of cables as required by the make and model of the fire alarm system that is to be installed.

L. For locations where devices have to be surface mounted to surface boxes, provide special red surface type boxes ordered from the fire alarm device manufacturer. Do not just use standard 4/S boxes with knockouts.

## PART 3 - EXECUTION

### 3.01 GENERAL

A. Fire alarm system shall not be used for any purpose other than fire alarm functions.

B. Fire alarm shall be interconnected but not limited to the following systems:

1. All systems required by code to be connected to the fire alarm systems shall be connected.

2. Ventilation systems where required for the purpose of fan shutdown

3. Damper control or smoke management systems.

4. Water based fire sprinkler systems.

5. Chemical fire extinguisher systems.

3.02 SYSTEM INSTALLATION

A. Install required conductors to devices indicated on Drawings. Provide required conductor terminations to devices for a complete system to function as specified and indicated on Drawings. Refer to Section 16120: Wire and Cable, for installation and color coding requirements.

B. Splices are not allowed in junction boxes. Terminations shall be in terminal cabinets or on equipment terminals. There shall not be any splicing in underground boxes, no exception.

C. Conductors shall be installed within conduits, boxes, and terminal cabinets in a totally enclosed installation. Furnish and install conductors required to connect incoming and outgoing circuits, including spare conductors, to terminal strips within terminal cabinets.

D. Wiring within equipment and terminal cabinets shall be installed to conform to contract documentation and NFPA 72 standards, and shall be terminated on terminal blocks having terminals for required connections. Wiring shall be cabled, laced, and securely fastened in place so that no weight is imposed on equipment or terminals.

E. Install required terminal blocks within terminal cabinets. Terminal blocks shall be installed on inside back of cabinets only, not on side. Incoming wiring shall be terminated on the left side of terminal blocks; outgoing wiring shall be terminated on the right side of the terminal blocks.

F. Conductors shall be color-coded per specification section 16120 Low Voltage wires and tagged with code markers at terminal cabinets, and equipment. A wire index shall be typed and installed on terminal cabinet doors. Index shall be covered with clear plastic adhesive covers. Wiring shall be identified as to building and location of devices in the index.

G. Wiring within equipment and terminal cabinets shall be carefully strapped, and shall be formed in rectangular configuration. Wires shall be properly numbered in numerical order and shall maintain same number throughout the Project site.

H. Complete installation shall comply with local building codes and applicable provisions of the California Electrical Code, California Fire Code and the NFPA 72 National Fire Alarm Code.

I. Location of outlet boxes and equipment on Drawings is approximate, unless dimensions are indicated. Do not scale Drawings to determine locations and routing of conduits and outlet boxes. Location of outlet boxes and equipment shall conform to architectural features of the building and other Work already in place, and must be ascertained in the field before the start of Work.

J. Drawings generally indicate Work to be provided, but do not indicate all bends, transitions or special fittings required to clear beams, girders or other Work already in place. Investigate conditions where conduits are to be installed, and furnish and install required fittings.

K. Provide p-touch label of approximately 1 inch wide with red lettering for each initiating device that is hidden from view. Tags shall indicate the name and type of device: Heat Detector, or Duct Smoke Detector. Tags shall be permanently attached on access panel or t-bar grid which is used to access a hidden device.

L. Provide and install adjacent to each annunciator a neatly typewritten copy of the Fire Alarm Operating Instructions. The instructions shall reflect the installed and programmed features of the system. Instructions that include information on non-installed or programmed features will not be acceptable. The instructions shall be placed into a suitably sized dark colored wood or metal frame with a glass document face cover. The frame shall be attached to the wall with a minimum of two screws into the wall material with appropriate anchors.

M. Provide and install adjacent to each annunciator a neatly drawn site map showing all rooms with designations and buildings with names as programmed into the system. This map shall be sized to allow (normal vision) reading of the designations, names etc. A map so reduced in size to the point of not being readable will not be acceptable. This map shall include symbols indicating the locations of all installed fire sprinkler flow switches, riser shut off valves, post indicating valves and manual pull stations. Provide a symbol list on the map for the symbols used. The site map shall be placed into a suitably sized dark colored wood or metal frame with a glass document face cover. The frame shall be attached to the wall with a minimum of two screws into the wall material with the appropriate anchors.

3.03 SYSTEM OPERATION

A. Unless otherwise specified, but not limited to actuation of manual stations, smoke detectors, heat detectors, linear heat or smoke detectors, or water-flow switches shall cause the following operations to occur:

1. Activate audible circuits.

2. Actuate strobe units until the panel is reset or strobe circuit time-out.

2. Release magnetic door holders to doors to adjacent zones on the floor from which the alarm was initiated.

3. Activation of fire sprinkler system low-pressure switches, post indicator valve or tamper switches shall initiate a system supervisory alarm indication.

4. UL listed central station shall be notified via – Universal Digital Alarm Communicator Transmitter (UDACT).

3.04 TESTING

A. A 48 hour notice shall be provided to the IOR before final testing.

B. Testing of fire detection system shall be as required by the State Fire Marshal and local authorities having jurisdiction. Installer is responsible for identifying required testing, coordinating, scheduling, and conducting tests before Substantial Completion. Tests shall include the following:

1. Operation of all signal-initiating devices (smoke detectors, heat detectors, pull stations etc.).

2. Operation of all indicating devices (alarm horns, alarm bells and alarm strobes).

3. Operation of all system features under normal operation.

4. Operation of all system supervisory features.

5. Operation of all system features on standby power, with primary power turned off.

5. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

7. Close sprinkler system flow valves and verify proper supervisory alarm at the FACP.

8. Verify activation of flow switches.

9. Open initiating device circuits and verify that trouble signal actuates.

10. Open signaling line circuits and verify that trouble signal actuates.

11. Open and short notification appliance circuits and verify that trouble signal actuates.

12. Open and short (wire only) network communications and verify that trouble signals are received at network annunciators or reporting terminals.

13. Ground initiating device circuits and verify response of trouble signals.

14. Ground signaling line circuit and verify response of trouble signals.

15. Ground notification appliance circuit and verify response of trouble signals.

16. Check alert tone to alarm notification devices.

17. Check installation, supervision, and operation of intelligent smoke detectors.

18. Alarm conditions that the system is required to detect shall be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

19. When the system is equipped with optional features, consult the manufacturer manual to determine proper testing procedures.

C. Upon completion of installation of fire alarm equipment, provide to the OAR a signed, written statement confirming that fire alarm equipment was installed in accordance with the Specifications, Shop Drawings, instructions and directions provided by the manufacturer.

D. Demonstrate in presence of the IOR that circuit and wiring tests are free of shorts and grounds and that installation performs as specified herein and within manufacturer's guidelines.

E. Software Modifications:

1. Provide the services of a factory trained and authorized technician to perform system software modification, upgrades or changes. Response time of the technician to the Project site shall not exceed 24 hours.

2. Provide hardware, software, programming tools, and documentation necessary to modify the fire alarm network on the Project site. Modification includes: addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modification on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being provided.

E. Complete the inspection and testing form as required by NFPA 72, and submit one copy of the completed form to the Architect and IOR.

3.05 OPERATING/SERVICE MANUALS

A. Deliver to OAR, 3 copies of service manuals including the following:

1. Installation manuals, programming manuals and user manual if applicable for every control panel, control panel power supply, FACP input/output/relay or control module, auxiliary power supply, UDACT, remote NAC extender power supply, door holder power supplies, all installed annunciators, initiating and indicating devices and all addressable monitor, relay and control modules. Catalog cut sheets are not acceptable.

2. A printed copy of the system configuration as programmed, including all system labeling codes, and passwords.

3. An electronic copy on compact disk of the system configuration program

4. Final test report.

5. Detailed explanation of the operation of the system.

6. Instructions for routine maintenance.

6. Detailed wiring diagram for the connection of relays, addressable monitor, control or relay modules as applied in the interfacing of peripheral systems or equipment to the fire alarm system.

7. An electronic copy (CD) of the posted site/fire alarm map in Auto-Cad and pdf formats.

8. A single reproducible set of record drawings reflecting the system exactly as it was installed including exact location of components.

10. Provide codes and passwords for fire alarm system at testing.

3.06 SPARE PARTS

A. The following new spare parts shall be furnished in unopened boxes:

1. 5% spare pull stations including the associated monitor module (minimum one spare pull station per type).

2. 5% spare smoke and heat detectors (minimum one spare smoke and heat detector per type).

3. 5% spare audible devices (minimum one spare audible device per type).

4. 5% spare strobe devices (minimum one spare strobe device per type).

3.07 SYSTEM USER AND MAINTENANCE PERSONNEL TRAINING

A. Before Substantial Completion, provide one instruction period for the Project site based Owner operators and system users.

1. The instruction period shall be scheduled and coordinated by the OAR.

3.08 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.09 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION

# SECTION 16728

# INTERCOMMUNICATIONS, PUBLIC ADDRESS, MASTER CLOCK & CLASS CHANGE SIGNALING SYSTEM

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

### 1.02 WORK INCLUDED

A. The contractor shall provide a combination public address, loud speaking intercom, master clock and class change and emergency tone signaling system. The system shall be a modular plug-in printed circuit board type, using HMOS Microprocessor, TTL Logic and HCMOS Memory and Sensing. System shall provide DTMF signaling, dial tone, ringing and busy signals to allow full integration with the telephone system.

B. The contractor shall provide interior and exterior loudspeakers, Administrative telephone, wall display, clocks as shown on the drawings and provide and connect all conductors and terminal strips in cabinets and backboards necessary to provide for the functions and the requirements specified herein.

C. Complete UPS systems shall be provided to back-up the PA rack and the nodes. A minimum back up of 60 minutes is required.

D. Provide all conduit, surface raceways, outlet boxes, junction boxes, pull boxes, terminal cabinets, and similar devices required for work under this section.

E. Provide engineering, testing, materials components and supervision necessary to provide a complete operable installation. Authorized dealer to insure proper installation shall install systems.

### 1.03 RELATED WORK

A. Section 16010 - Basis Materials and Methods.

### 1.04 EQUIPMENT SUPPLIERS

A. Equipment and materials shall be provided and installed by a factory authorized distributor to ensure proper specification adherence, final connection, test, turnover, warranty compliance, and service.

B. The specification is based on the equipment of manufacturers who have been approved by the district and the manufacturers herein named shall be considered as meeting the requirements of this specification. For all items which are identified by part number and manufacturer the performance specifications which are published in the most recent manufacturer’s data sheet available at the time of bidding this project shall be applicable to the present work as though fully written out herein.

C. The equipment shall be Bogen Quantum Multicom IP.

D. Service Availability:

1. The supplier shall maintain sufficient stock on hand and have a fully equipped service organization capable of guaranteeing response time within four (4) hours of service calls, 24 hours a day, 7 days a week to service completed systems.

1.05 CODES

A. Work shall be performed in accordance with all applicable requirements of all governing codes, rules, and regulations including the following minimum standards, whether statutory or not:

California Building Code (CBC)
California Electric Code (CEC)
National Fire Protection Association (NFPA)
City, State, and other codes and requirements

B. All equipment must be registered with the FCC.

C. All equipment must be listed by Underwriters Laboratories or a nationally recognized testing laboratory empowered by the United States Occupational Safety and Health Administration to issue listing names which are equal to U.L.

1.06 TRAINING OF DISTRICT PERSONNEL ON MAINTENACE OF SYSTEM

A. The contractor shall provide training for two employees of the School District. The training shall be for all equipment and devices furnished in this section of the specifications.

B. The training shall include all instruction, tools, and equipment necessary for installation service maintenance and programming of the equipment and devices. At completion of training the technicians shall be certified by the manufacturers.

1.07 DOCUMENTATION AND SUBMITTAL

A. Contractor Qualifications

1. A copy of the contractor's valid State of California Contractor License.

2. Proof that the contractor has been regularly engaged in the business of electronics contracting consisting of, but not limited to, engineering, fabrication, installation, and servicing of electronic systems of the type specified herein for at least the past ten-(10) consecutive years. Provide a statement summarizing any pending litigation involving any officer or principal of/or the bidding company, the nature of the litigation and what affect the litigation may carry as it relates to this work in the worst case scenario. Non-disclosure of this item, if later discovered may result, at the owner's discretion, in the contractor bearing all costs attendant with the transfer of the work to a new firm and any cost related to associated delays in the progress of the work.

3. A list containing at least ten (10) California installations comparable in scope and nature to that specified in the contract documents.

4. Submit complete documentation indicating in detail that the contractor has competent engineering, installation, service and maintenance personnel and facilities with reasonable stock of service parts within fifty air miles of the job site. Contractor shall submit a warranty statement certifying that they are capable of conforming to specified warranty requirements.

5. Contractor shall submit a letter from the public address system manufacturer stating that the contractor is an authorized distributor/contractor for the equipment he proposes to use on this project and is licensed to purchase and install the software required to provide the specified functions.

B. Submittal shall be made within thirty (30) calendar days after the award of the contract or as required by other sections. Submit six (6) copies of the following:

1. Complete bills of quantities, including all materials, components, devices, and equipment required for this work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each item listed:

1-a. Quantity
1-b. Description
1-c. Manufacturer's Name and Model Number
1-d. Manufacturer's Specification Sheet

2. A statement of franchises, distributorships, dealerships, arrangements and agreements with manufacturers of equipment to be used for this work as specified above.

C. Submit shop drawings. All shop drawing shall be engineered and drawn on a vector/raster based CAD System. Approved software is AutoCAD 2002.

1. Complete floor plans, at scale of contract documents, showing the locations throughout the project of all receptacles, conduits, wire ways, tray, pull boxes, junction boxes, equipment racks, telephones, speakers and the PABX switch and other devices.

2. Complete system riser diagrams, showing all elevations, room numbers, conduit sizes, types and fills, box sizes and types, devices, equipment and rack designations.

3. Complete scaled (1/4" = 1") equipment rack elevation drawings, including equipment designation, manufacturer's name, and model number.

4. Run sheets or field wiring drawings: clearly show at each terminal point, the type of connector to be used and include point to point wiring details of each connector. Note where shields are connected and where they will float to ensure the integrity of the grounding system. Call out wire types and color-codes where appropriate.

D. Near completion of installation submit the following record drawings developed from the final "As-Built" systems:

1. Floor plans, diagrams, details and CAD drawing disks. All drawings shall be clearly labeled as "As-Built."

2. No less than thirty (30) days prior to jobsite acceptance testing, submit one (1) preliminary copy of each of the following manuals prior to, and as a requirement of, Owner acceptance of the work of this section.

   a. Equipment operating instructions: complete comprehensive instructions for the operations of all contractor fabricated devices and equipment items provided as part of the work of this section.

   b. Systems operating instructions: complete instructions for the operations of the systems provided as part of the work of this section.

   c. Manufacturer's original operation instruction and service manuals. All brochures, manuals and service sheets published by the manufacturer(s) of the equipment for systems checkout and acceptance tests.

3. Provide on the job training in the operation of the electronics systems for personnel designated by the Owner, during the first thirty (30) calendar days of operation. In general, training must be able to start a minimum of five (5) working days prior to a system's completion date. Project training periods shall be scheduled to occur during the normal school day.

1.08 DELIVERY, STORAGE AND HANDLING

A. Contractor shall bear the costs of all shipping to the site, and of all unusual storage requirements. Make appropriate arrangements, and coordinate with authorized personnel at the site, for the proper acceptance, handling, protection, and storage of equipment so delivered.

1.09 WARRANTY

A. Warranty Period: Warrant all of the work of this section to be free from defects in materials and workmanship for period of twelve (12) months from the date of Owner acceptance or from the date of first usage of the work by Owner personnel. The first usage date shall be agreed to in writing by the owner and contractor within five (5) working days of first usage. Component warranty service shall apply to repairs only made necessary by normal component wear and proper component usage. The warranty service does not apply to any Owner furnished equipment and labor. Transportation of warranty substitutes, or test systems, equipment, devices, material, parts and personnel to and from the jobsite shall be at no expense to the Owner during the warranty period.

B. Activate all manufacturers’ equipment warranties in Owner's name to commence on the date of acceptance.

C. Warranty operations: the electronic systems are absolutely vital to the operation of the communications - thus, special warranty service requirements will be required in excess of normal contract documents. Contractor shall provide the Owner with a local Southern California telephone number, which, during normal working hours, or during non-standard working hours will be answered by a professional telephone answering service. In the event of a malfunction, the pre-designated owner's representative(s) will call the contractor's warranty service telephone number and request service. The contractor will

respond to the Owner's initial service request within (4) hour’s time. The contractor's initial response shall consist of qualified personnel arriving at the school and reviewing the Owner's service request. Contractor's service personnel shall then initiate a program of repair to start to correct the service problem as soon as possible.

D. Three (3) separate visits shall be conducted by the contractor, at four (4) month intervals during the warranty period, in order to verify that each system component and the complete system are functioning correctly. The inspection visits shall be conducted at times, which shall be reasonably determined.

E. Warranty service calls made by telephone to this Contractor or his designated representative shall hereby is defined as proper notification that warranty service is required.

F. Inventory: Contractor shall maintain, within the fifty (50) air mile area, a reasonable inventory of all parts necessary to provide service according to the specified warranty requirements.

PART 2 - PRODUCTS

2.01 PMENT MANUFACTURERS

A. blic address, loud speaking intercom, class change signaling shall be:

Bogen Quantum Multicom IP.

2.02 RAL REQUIREMENTS

A. l equipment shall be new and unused. All components and system shall be designed for uninterrupted duty. All equipment, materials, accessories, devices and their facilities covered by this specification or noted on contract drawings and installation specifications shall be the best suited for the intended use and shall be provided by a single manufacturer or if provided by different manufacturers, recognized as compatible by both manufacturers.

B. e Integrated Communications System shall provide a comprehensive communication network between administrative and staff locations. The central processor and switching unit shall be of modular plug-in printed circuit board type, using HMOS microprocessor and TTL logic and HCMOS memory and sensing. HCMOS circuitry shall be protected with transient voltage surge suppression devices on all inputs and outputs. Non-volatile EPROM shall store permanent memory and non-volatile EEPROM shall store field-programmable memory. Systems, which use a battery to maintain system configuration information, shall not be acceptable.

C. e system is to be designed and configured for maximum ease of service and repair. All major components of the system shall be designed as a standard component of one type of card cage. All internal connections of the system shall be with factory-keyed plugs designed for fault-free connection. The printed circuit card of the card cage shall be silk screened to indicate the location of each connection.

D. ug disconnect: All major equipment components shall be fully pluggable by means of multi-pin receptacles and matching plugs to provide for ease of maintenance and service.

2.03 ION INCLUDES

A. tegrated Communications System for School Application

1. tercom System - Two way communication between any administrative phone and any classroom speaker.

   a) Call initiation switches. (as shown on drawings)

2. ministrative telephone and wall display.

3. blic Address System

4. ster Clock functionality with bell schedules and timed events.

5. blic automated building exchange system (Passing Bells)

6. ice over Internet Protocol (VoIP) communication modules.

7. terface to Private Branch Exchange (PBX) or Voice over Internet Protocol (VoIP) system. Provide additional co trunk ports at Telephone switch for interface such that all existing telephones on the Toshiba existing can access the PA/Intercom system. Do all necessary reprogramming.

2.04 EM SOFTWARE PARAMETERS

A. e communication system shall be a Bogen Quantum Multicom IP and shall provide a comprehensive communication network between administrative areas and staff locations throughout the facility. Nonvolatile memory shall store permanent memory and field-programmable memory. A system, which uses a battery to maintain system configuration information, shall not be acceptable. The system shall provide no less than the following features and functions:

1. lephonic communication (complete with DTMF signaling, dial tone, ringing and busy signals, and data display) on administrative stations shall use two wires. Systems that use more than two wires for communication, tones and data display shall not be acceptable.

2. plified-voice communication with loudspeakers shall use a shielded audio pair.

3. e system shall be available in the following configurations (all catalog numbers are based on Bogen equipment):

   a) MC2K Wall-mounted in a custom enclosure. Station capacity shall be from 24 to 130 stations. All stations shall have the ability to support displays.

   b) MC2KR Rack-mounted. Station capacity shall be from 24 to 250 stations. All telephone stations shall have the ability to support displays.

   c) QRC24 & QRC48 Compact Quantum Rack System. Station capacity shall be from 24 to 48 stations. All stations shall have the ability to support displays, with an option to add up to 8 Central Office phone lines.

4. e system shall consist of any combination of the following: Administrative Display Phones, Administrative VoIP Phones, and Administrative Phones.

    a) Staff Classroom Stations shall consist of wall- or ceiling-mounted loudspeakers with call-in switches.

    b) Administrative phone stations shall consist of VoIP phones, display phones, or DTMF dialing 2500 analog-style telephone sets.

    c) Administrative Display Phones shall be DTMF-dialing digital telephone sets with a 4x16 character LCD display panel. They shall be equipped with a standard 12-key push-button dialing keypad. Phones requiring external LCD displays shall not be accepted as an equal. Optionally, a loudspeaker may be connected at each administrative station location.

        1. Provide an Administrative Wall Display at the Administrative Station.

    d) Administrative Display Phones and Administrative Phones shall have the option of including a loudspeaker.

    e) All types of stations except administrative VoIP phones shall utilize the same type of field wiring. Future station alterations shall only require the station type to be changed and the proper software designation to be selected. Alterations shall not require field wiring or system head-end alterations. All field wiring and system head-end equipment shall support any type of station, at the time of installation. All contractor proposals shall reflect this capacity. Failure to submit and bid this project in this manner will be deemed as being in direct conflict of these specifications and will be rejected.

    f) There shall be no limit to the number of administrative display stations within the total capacity of the system.

    g) It shall be possible at any time to change the type of station at any location without equipment or wiring changes except for administrative VoIP phones that utilize existing LAN connections. Systems that limit the quantity of each station type or require future additional equipment and/or system expansion to provide additional administrative telephones shall not be accepted as an equal.

5. e system shall be a global switching system, providing up to 512 unrestricted simultaneous private telephone paths per facility. The system shall also be capable of providing up to 512 amplified intercom paths per facility. One amplified intercom path shall automatically be provided with each increment of 24 stations of system capacity. All hardware, etc., required to achieve the necessary number of amplified-voice intercom channels for this system shall be included in this submittal. Amplified-voice intercom channels shall provide voice-activated switching. Systems requiring the use of a push-to-talk switch on administrative telephones shall not be acceptable. There shall be an automatic level control for return speech during amplified-voice communications. The intercom amplifier shall also provide control over the switch sensitivity and delay times of the VOX circuitry.

6. is of utmost importance that emergency calls from staff stations receive prompt

attention. Therefore, it is important that there be an alternate destination in case the emergency call does not get answered at the primary location. To this end:

a) The system shall provide 911 Dial-Through with specific outside line(s) dedicated only for this function to ensure that the line is available all the time for 911 calls. The 911 Dial-Through is available to any station that can dial.

b) The 911 CO lines will be pre-configured and reserved. If the 911 reserved lines are busy, the normal CO lines will be connected to route the 911 calls. If all the normal CO lines are busy, the ongoing call shall be disconnected and the 911 call shall be placed.

c) Staff-generated Emergency calls shall be treated as the second highest system priority. Therefore, all Emergency calls shall annunciate at the top of the call queue of their respective administrative telephone(s). Should that emergency call go unanswered for 15 seconds, the call shall be re-routed to an alternate speaker station then prompt the caller to make a verbal call for help. During the transfer, the original administrative telephone shall continue to ring the distinctive Emergency Ring. Should the Emergency Transfer to Station have an associated administrative telephone, it too shall ring the distinctive Emergency ring.

d) The Emergency Transfer to Station shall be field programmable.

e) Should the original administrative telephone be engaged in a non-emergency conversation, its conversation shall be automatically terminated, indicated with an alert tone, and then reconnected to the station that generated the Emergency Call.

f) Should the administrative telephone be engaged in an emergency conversation, successive emergency calls shall log into the call queue as well as transfer to the Emergency Transfer Station for their verbal call for help. Upon termination of the initial emergency conversation, the next one shall immediately ring the administrative telephone.

g) Systems failing to transfer unanswered Emergency calls or failing to immediately connect to the administrative telephone shall not be deemed as equal.

7. ere shall be a System-Wide Facility Emergency All-Call feature. The Emergency All-Call shall be accessed from designated administrative phones or by the activation of an external contact closure which shall give the third audio program input emergency status. The Emergency All-Call function shall have the highest system priority and shall override all other loudspeaker-related functions including Time Tone Distribution.

a) Considering that emergencies calls are to be treated with the highest level of concern. Systems which do not regard Emergency-All-Call page from an administrative telephone with the highest priority shall not be deemed as equal.

b) Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access emergency functions.

c) The Emergency All-Call shall capture complete system priority, and shall be transmitted over all speakers in the facility. It shall also activate an external relay, which can be used to automatically override volume controls and other systems.

d) Systems without Emergency All-Call, or systems with All-Call that cannot be activated by external means, or which do not capture complete system priority or activate an external relay, shall not be acceptable.

8. ere shall be at least four Dedicated Emergency Alarm Tones. Each may be accessed by dialing a three-digit number from designated administrative telephones. These emergency tones should be separate from the time tones. Systems using external alarm generators, or having less than four emergency alarm tones shall not be acceptable.

   a) Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access Emergency Alarm Tones.

9. ere shall be four (4) External-Function Relay Driver Outputs, accessible from designated Quantum Commander Users or Administrative Display Telephones by dialing a four-digit number. These outputs remain set until accessed and reset at a later time. The user shall have the ability to review the status of each relay driver. A plain English menu, prompting the user through the fields without requiring the user to remember any dialing sequences shall support this feature. Systems that require the user to remember complicated dialing schemes or prompt the user via cryptic commands shall not be deemed equal.

   a) The stations shall be capable of being programmed for security contact relays for use with magnetic locks, motion detectors, cameras or any low-voltage, dry contact creating device. System using security stations for control of external functions shall not be acceptable.

   b) Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access external relay functions.

10. re shall be a program-material interface included with each node, which shall accept up to four (4) Bogen Power Vector Series program modules. Systems requiring an external program source interface shall not be acceptable.

11. re shall be an outside line capability. The circuitry shall interface with the station ports of an external telephone system, and shall provide facilities for up to 960 incoming lines per facility which shall be designated by the user to ring "day" and "night" administrative display stations or administrative stations. Where an administrative display station is designated to receive outside line calls, the phone shall ring with a unique tone and the outside line number shall appear on the display panel. The option shall also provide the ability to make outside line calls from Administrative Display Stations or Administrative Stations. This ability shall be programmable for each phone and there shall be thirty-two Classes of Service available to any station. This feature shall be capable of supporting DID, DISA, and a Security DISA function.

a) Cellular system access for Security is of the utmost concern. Wireless security page offers a password-protected Security DISA feature that shall be accessible only from authorized Police, Fire, Emergency personal or an off-premise security office, which monitors the facility's security system. It shall function as follows: upon confirmation of the password DISA number, the system shall allow security personnel to dial access any station and monitor the activity without pre-announce tone or the privacy tone. This will then allow the security office to determine exactly what the conditions are in the station and the actions need to be taken.

12. system shall provide for field-programmable three-, four-, five-, or six-digit architectural station numbers.

13. re shall be an automatic level control for return speech during amplified-voice communications.

14. h station loudspeaker shall be assignable to any one, any combination, or all of the Multi-purpose zones.

15. re shall be thirty-two (32) Flexible Time-Signaling Schedules with a total of 1024 user-programmed events per facility. Each event shall sound one of user-selected tones or external audio. It shall be possible to assign each schedule to a day of the week, or manually change schedules from an authorized Quantum Commander User via Web browser. Systems, which do not provide a minimum of thirty-two (32) flexible time-signaling schedules or a choice of eight (8) time tones plus external audio, shall not be acceptable.

16. nternal program clock (with battery backup) shall be included, allowing a total of 1024 user-programmed events per facility. It shall be possible to synchronize the internal program clock with an external master clock. Systems, which do not provide an internal program clock and/or can not synchronize with an external master clock to meet these specifications, are not equal.

    a) There shall be thirty-two (32) flexible time-signaling schedules. It shall be possible to assign each schedule to a day of the week, or manually change schedules from an authorized Quantum Commander User via Web browser on the LAN/WAN.

    b) The built-in Master Clock corrects time by accessing the LAN/WAN NTP time server.

    c) The Quantum Processor is capable of adjusting the Daylight Savings Time automatically.

    d) Each event shall be able to be directed to any one or more of the sixty-four (64) Multi-purpose time-signaling zones.

    e) Each of the 64 Multi-purpose zones shall have a programmable "tone duration" unique unto itself. For example: the gymnasium shall receive a time tone for ten (10) seconds while the rest of the facility receives a tone for five (5) seconds.

    f) Each event shall sound one of eight (8) user-selected tones or external audio.

Each event may utilize a different custom tone. It shall be utilized to send the gymnasium, shop classes, and pool (if necessary), a separate time tone to indicate "clean up." Minutes later the entire facility can then receive the same time tone to indicate class change.

g) Each of the eight (8) Distinct Time Tone Signals may be manually activated by selected Administrative Display Phones or from an authorized Quantum Commander User via web-browser. These tone signals shall remain active as long as the telephone remains off-hook, or until canceled from the keypad or Quantum Commander.

1) Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter the next digit. In this way, the user shall not be required to memorize complicated key sequences in order to access manual time-tone functions.

2) Systems that do not provide at least thirty-two (32) flexible time signaling schedules or do not provide automatic activation of schedules shall not be acceptable.

17. re shall be a zone-page/all-page feature that is accessible by selected administrative VoIP phones and administrative phones.

a) There shall be automatic muting of the loudspeaker in the area where a page is originating.

b) There shall be a pre-announce tone signal at any loudspeaker selected for voice paging.

18. re shall be a voice-intercom feature that is accessible by selected administrative phones, administrative VoIP phones and all administrative display phones.

a) There shall be a periodic privacy tone signal at any loudspeaker selected for amplified-voice communication.

b) There shall be a pre-announce tone signal at any loudspeaker selected for voice-intercom communication.

c) Privacy and pre-announce tone signals shall be capable of being disabled during system initialization.

d) There shall be an automatic switchover to private telephone communication should the person at the loudspeaker pick up his handset.

e) By picking up the receiver and dialing the first digit of the number of the station to be called, that number shall appear on the display along with a loudspeaker symbol, prompting the user to enter the next digits. There shall be no confusion as to the type of conversation that is to be established.

19. re shall be a telephonic communication feature, which is accessible by all Administrative VoIP Phones, Administrative Phones, and Administrative Display Phones.

a) There shall be an audible ring signal announcing that a call has been placed to that station.

b) Upon picking up the receiver and dialing * (star), a telephone symbol shall appear on the display, prompting the user to enter the number of the station to be called. There shall be no confusion as to the type of conversation that is to be established.

c) There shall be an automatic disconnect of Staff Handsets left off-hook to prevent them from tying up communications channels. The station shall receive a busy signal and shall automatically disconnect after 45 seconds. Systems shall also be capable of doing off hook emergency call-in.

d) There shall be an automatic disconnect of Administrative Display Phones, Administrative VoIP Phones, and Administrative Phones to prevent them from tying up communications channels. When a phone goes off-hook and does not initiate a call within ten seconds, the station shall receive a busy signal and shall automatically disconnect after 45 more seconds.

e) Staff and Administrative Phone Stations may be programmed to ring an Administrative Display Phone during day hours and another Administrative Phone during night hours. Day and Night Hours shall be user-programmable. Assignment of Staff Stations shall not be restricted to any particular Administrative Station. Systems that limit the number and assignment of staff call-in to particular Administrative Station of Administrative Stations shall not be acceptable.

20. h staff call station shall be programmable for one of three call-in types, as follows:

a) Normal / Emergency
b) Urgent / Emergency
c) Emergency

1) Staff Call Stations programmed for access Normal / Emergency or Urgent / Emergency shall be able to initiate an emergency call by repeated flashing of the hook switch or repeated pressing of the call-in switch. Systems, which require additional switches and/or conductors to initiate an emergency call, shall not be acceptable.

2) Emergency Calls from Administrative VoIP Phones, Administrative Phones or Staff Call Switch Stations shall interrupt a non-emergency call in progress at the designated Administrative Display Phone. The administrator shall receive a warning tone and be connected to the emergency caller. The disconnected party shall receive a busy signal. Systems which do not provide emergency call interrupt shall not be acceptable.

3) It shall be possible to connect a single push emergency call-in switch to any Administrative VoIP Phone or Administrative Phone, without effecting normal station operation.

4) Normal and Urgent calls shall be logged into queue for the designated administrative display phones.

5) Administrative Display Phones shall ring for a period of 45 seconds when they receive a call, and then stop ringing.

6) Each queue shall first be sorted according to call priority (emergency calls, then urgent calls, and then normal calls). Calls are sorted within each priority level on a first-in, first-out basis. When a call is answered, it shall automatically be removed from the queue. Systems, which do not sort calls according to priority and order received, shall not be acceptable. 1) The display shall simultaneously show up to four (4) Staff Call Switch Station Calls pending. Additional calls, beyond four (4), shall be indicated by an arrow pointing down thus prompting the user that additional calls are waiting.

7) It shall be possible to answer any incoming call simply by picking up the handset while it is ringing. It shall not be necessary to hit any buttons to answer a call unless the call has dropped into the queue.

21. inistrative VoIP Phones or Administrative Phones shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired station. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be an automatic switchover from loudspeaker to private telephone communication should the person pick up the handset.

    a) Administrative VoIP Phones or Administrative Phones shall be able to make a normal call to any Administrative Display Phone by dialing the number. They shall also be able to initiate an Emergency Call by flashing the hook switch. Emergency Calls shall ring the Designated Day/Night Administrative Display Phone and then their speaker will be connected to the emergency station if not answered within a predetermined time period. The system shall provide for selected administrators to have a PIN Numbers. By dialing the PIN at any system telephone, the administrator shall have access to emergency paging regardless of the restrictions on the particular phone being used.

22. inistrative Display Phones shall be equipped with a 4x16 character alphanumeric display panel.

    a) Administrative Display Phones shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired stations. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be an automatic switchover from loudspeaker to private telephone communication should the person pick up his handset.

    b) The display shall normally show the time of day and day of week, the current time signaling schedule, and the numbers of up to four stations calling in along with the call-in status of each station (normal, urgent, emergency). When dialing from the Administrative Display Phone, the display shall indicate the station number and type of station (loudspeaker or handset) being dialed.

    c) The display shall also provide user-friendly menu selections to assist the operator when paging and distributing program material. Displays shall be in English with internationally recognized symbols for maximum ease of use. Systems, which require the operator to memorize long lists of operating symbols or control codes, shall not be acceptable.

d) Administrative Display Phones shall be programmable for one of 3 station types for system access, as follows:

1) Shall permit dialing any station in the system; turn program material on/off at their location; scroll, erase and auto-dial call-waiting queue; make conference calls and transfer calls; call forward to other administrative stations; make all-zone pages and emergency all-zone pages; have access to outside lines and be designated to receive outside line calls.

2) Select and distribute or cancel program material to any combination of stations, paging zones, or all zones; set/reset alarm/external functions and zone paging.

3) Bump or join a conversation in progress, manually initiate time tones.

e) Program selection, and its distribution or cancellation shall be accomplished from a designated administrative display telephone, with the assistance of the menu display system. Distribution and cancellation shall be to any one, or combination of speakers, or any zone(s), or all zones. It shall be possible to provide three program channels at the same time.

f) It shall be possible, via an Administrative Display telephone, to manually initiate any of eight (8) tones or any of the emergency tones. The tones shall be separate and distinctly different from the emergency tones. The tone selected shall continue to sound until it is canceled, or until the administrative display phone is placed back on-hook.

g) Each Administrative Phone shall maintain a unique queue of all stations calling that particular phone.

23. tem programming shall be from an authorized Quantum Commander User via Web browser. All system programming data shall be stored in nonvolatile memory. A valid password shall be required to gain access to the following programmable functions:

a) Station Initialization shall be accomplished from an authorized Quantum Commander User via web browser. All station initialization data shall be stored in nonvolatile memory. A password (separate from the password necessary for system programming) shall be required to gain access to the following station initialization parameters:

1) Programming and diagnostics shall be built into the Quantum Commander web server browser and be accessible only by authorized personnel. Diagnostics shall indicate passes and failures of system memory, system clock, all audio busses, tone generators, DTMF generators and decoders and the integrity of the field wiring.

2) The diagnostics feature shall be the Quantum Commander. It shall be possible to individually select the test and card, or all to run diagnostics on. This shall be a standard feature of the system and supplied at the time of installation. It shall be accessible only by authorized stations and personnel.

3) Systems not capable of supporting web-based diagnostics and any computer

interface for programming and diagnostics, nor supportive of built-in diagnostics for the end user shall not be deemed as equal.

24. lover EOL (End-Of-Line Device)

    a) This feature shall be supported for all the Stations (Staff/Enhanced/Admin/SIP) configured with a loudspeaker. Based on the dialed sequence, (*xxx, xxx) the call will be connected to the corresponding station/speaker. If the speaker/station is busy, the call is rolled over to the station/speaker corresponding to that station.

    b) If a handset station, configured with this feature, is busy when an Admin User calls the station, the call shall be rolled over to the associated speaker. If the speaker is also busy in this case, then the Admin call can bump the conversation.

    c) Rollover End-of-Line features not applicable with the Station with Call Switch or Station without the speaker.

    d) For calls initiated by a call switch or a non-dial handset, rollover to the admin speaker shall not happen.

25. in AAA Group (Always An Answer)

    a) This is an Administrative Phone feature. This feature shall be programmed from the Bogen Commander. A maximum of 10 Admin Phones will be supported in an Admin Group and there shall be a maximum of 32 Admin Groups per facility.

    b) Once the Admin Group is set:

        1) For normal calls, if the primary Day/Night Admin Phone is busy/no answer, all the phones in the Admin Group shall ring.

        2) For emergency calls, if the primary day/night phone does not answer, all the phones in the Admin Group shall ring.

        3) On no answer from any of the admin phones and if the emergency announce link is configured, the call shall be transferred to the emergency announce link as per the existing procedures.

        4) On answer from any of the Admin Phones, all the other phones shall stop ringing.

2.05 EM REQUIREMENTS

A. e Integrated Communications System shall be a Bogen Quantum Multicom IP or Rauland Telecenter VOIP.

B. e system shall provide no less than the following features and functions:

1. tegration to public branch-exchange for a complete and integrated telephone intercommunication solution. All features and functionality’s of the system shall be accessible from the Private Branch Exchange (PBX or phone switch) or Expansion Key Service Unit (EKSU), so as not to depend on the administrative phones for all functionality.

2. e system shall be available in the following conguration:

    a) Rack mount.

    b) Single rack (node) capacity from 24 to 250 stations per node.

    c) All telephone stations shall have the ability to support displays.

3. e system shall consist of any combination of Administrative, Staff and Enhanced Staff Stations.

    a) A minimum of one (1) Administrative Telephone required per system.

    b) The maximum number of Administrative Telephones with displays shall only be limited by the Station capacity of the system.

        1) Systems that limit the quantity of each type of Station or require rewiring or additional equipment and/or system expansion to provide additional Administrative Telephones shall not be accepted as equal.

    c) Administrative Stations

        1) DTMF dialing telephone sets with a four (4) line by 16-character LCD display panel.

        2) Standard 12 key pushbutton dialing keypad

        3) Loudspeaker may be connected at each location

        4) Optional loudspeaker may be included

        5) Membrane-type keypads shall not be accepted as equal

        6) Special function keys to perform common functions shall not be accepted as equal

    d) Staff Station

        1) Wall or ceiling mount loudspeaker with call-in switch

    e) Enhanced Staff Station

        1) DTMF dialing telephone sets connected to the PBX or EKSU

        2) Systems that require telephones to be connected to the intercom system shall not be acceptable

        3) Optional loudspeaker may be included

    f) All Station types shall utilize the same field wiring

        1) Future Station alterations shall require station type change only, not field

wiring or head-end alterations. All field and system head-end equipment shall support any type of Station, at the time of installation. All proposed substitutions shall reflect this capacity.

4. e system shall be capable of providing up to four (4) simultaneously amplified- voice intercom paths. One amplified intercom path shall automatically be provided with each increment of 24 stations of system capacity.

    a) All hardware, etc. required to achieve the maximum number of amplified-voice intercom channels for this system shall be included in this submittal.

C. mote Access

1. The system shall be capable of remote access via LAN/WAN network.

    a) Remote access features and functions shall include the following:

        1) Perform programming of the main processor including all system features and functions noted elsewhere in this specification.

        2) The capability to perform system diagnostics and access integral system report software regarding the current system status for the following:

            (a) Processors
            (b) Station Cards
            (c) Amplifiers
            (d) Speaker Outputs
            (e) Call Switch Outputs

        3) Activation of bell schedules and programming of specific events, zones and action taken.

        4) Activation of all time tones, all calls, zone pages and call forwarding.

        5) Monitoring of unlimited areas for security purposes.

    b) External Device Server

        1) Shall support RS-232, RS-422 and RS-485 serial connections

        2) Shall configure via HTTP, DHCP, Telnet or serial

        3) Shall be capable of Flash ROM upgrades

        4) Network Interface – (10Base-T or 10Base-T/100Base-TX) Ethernet

        5) Serial Interface – DB25F, RS-232/RS-422/Rs-485 serial port with DCE configuration.

        6) Shall be capable of modem emulation and accept modem AT commands on the serial port to establish a network connection to the system.

2. The contractor shall provide all active electronics, software and peripheral equipment

for a complete and operable system.

3. Systems not capable of remote access requirements of this specification will not be considered acceptable.

D. aphical Interface Emergency Response/Crisis Management

1. e intercom system shall be capable of interfacing with a web based emergency management system. .The emergency management system shall offer two communications using the intercom speakers located throughout the campus.

a) Web based graphical interface

1) System shall allow for graphical representations of the school site & floor plan showing locations of emergency exits, security cameras, emergency access points, hazardous material storage, utility connections and safe zones to be used by emergency personnel.

2) System shall allow for web controlled password protected covert monitoring of any speaker location thru the intercom system in emergency situations by authorized emergency personnel.

2.06 EM COMPONENTS

A. NSOLE

1. ck-mounted equipment shall be Bogen Model TCPER

a) Rack-TCPER61 / TCPER77 (size rack as required)

2. RMP

a) Rack-mounting panel. Includes the following components:

1) MC512A-Power Supply (1 per system)

2) MC2626B-Power Supply (1 for up to 120 stations, 2 for more than 120 stations)

3) MCAPI-Audio Program Module Interface Assembly (1 per system)

3. RMF

a) Rack mounting mainframe (1 per 120 stations). Includes built-in ventilation fans and the following circuit cards:

1) QSPC1-Processor card (1 per system)

2) MCACB-Analog card (1 per 24 stations)

3) MCSC-Station card (1 per 24 stations)

4) MCJCA-Ribbon cable assembly (interconnects 2 MCRMF)

4. RM

   a) Relay module (1 per 24 stations). Mounts to:

      1) MCRRP-Stand-alone configuration.

5. ogram Sources

   a) Marantz DRA-395P AM/FM Receiver

   b) Marantz PMD-351 CD / Cassette Player

   c) Provide indoor AM/FM Antenna at main rack

6. wer Amplifiers, in Main Rack and in Nodes quantities as required

   a) HTA-125A-125 watt

   b) HTA-250A-250 watt

B. RIPHERAL DEVICES

1. MINISTRATIVE DISPLAY PHONE MCDS3

   a) Administrative display phone shall be Bogen Model MCDS3. The administrative telephone display panel shows the time of day and day of week, the current time signaling schedule, and the station numbers and call-in priority of staff stations that have called that particular administrative station. A 2-key response is used to scroll the display, and answer or erase normal and urgent calls. Depending upon the system access level, an administrative station can use display menus to activate zone pages, alarm signals and external functions, as well as select program sources and distribute or cancel a program to any or all speakers or zones.

      1) Administrative station has the option of dialing either the loudspeaker or phone at each station location. An automatic switch from phone-to-intercom to phone-to-phone communication is made when the staff handset is lifted.

      2) A built-in program clock, with battery backup, is included to automatically control class change or other signals. The clock may be synchronized with a master clock. 1024 events may be programmed into the system's eight time signaling schedules.

   2. LL IN SWITCHES

   1) Bogen CA21B or CA15C.

3. EAKERS

   a) Interior speakers ceiling mounted shall be Bogen S86T725PG8W with Lowell P8756 back box and SS24 tile support rails. Provide flush backboxes for recess wall mounted speakers. Speaker grille shall be Lowell JG86

b) Interior speakers wall mount shall be Bogen MB8TSL. Provide flush backboxes for recess wall mounted speakers. Provide appropriate combination speaker/clock boxes, flush mounted where possible or indicated for combination speaker/clock as shown on the drawings. Provide surface combination boxes where flush mounting is not possible.

c) Exterior speakers shall be Bogen FMH15T with Bogen SGHD8 Grille and FMHAR8 adapter kit. Speaker back box shall be Bogen BBFM6 for flush mount applications and Bogen BBSM6 for surface mount applications.

d) All speaker cables shall be individually homerun back to the main intercom backboard. Speaker cable shall be Beldon or Westpenn, type per manufacturer's written instructions.

e) Wiring shall be done per manufacturer's recommendation

f) All #22AWG connections throughout the system shall be made by spring tension clip "punch block", Siemons type 66 terminals or equal. Conductors #20AWG and larger shall be terminated on barrier screw terminals.

g) All communication system cable/wire shall be labeled at all points of termination. All labeling shall be based on the room numbers as provided by the Owner or his representative.

4. OCK SYSTEM

a) Master Control Unit: Microprocessor based unit with solid-state switching circuits, program control and clock controls.

1) The master clock shall be microprocessor based and programmable via the local onboard 12 button keypad or optional PC software. The master clock shall also provide field enable/disable daylight savings time. The programmable master clock shall be capable of storing, in a non-volatile memory, and controlling up to 512 events. The master clock shall have a ten-year battery backup for timekeeping, an RS232 computer interface port, and an input port to interface with other systems and WWVB/GPS interface capability.

b) Clocks: Analog synchronous clocks, with minute and second hands. Secondary clock shall be 12" round. The secondary clock shall accept sync-wire communication protocols with hourly and daily correction. The clock shall have a low-profile/semi-flush smooth surface metal case. The clock shall have black hour and minute hands and a red second hand. Clocks shall be 24-volt. Clock cable shall be 4 #12 thhn/thwn. Clock conductor colors shall be red, black, white & green. Clock wire shall be installed its own conduit as required by applicable codes. Provide power supply for clock system and clock boosters in buildings where appropriate. Provide 120-volt circuits to power supplies and boosters.

2.07 AND CABLE

A. l wire and cables shall be new and unused. All wire and cable shall be enclosed in

conduit unless otherwise noted. Wire not installed in equipment racks, not portable, or not installed in conduit shall meet all applicable codes.

B. nstant voltage (70-volt) speaker cable: West Penn stranded 16A WG twisted pair or approved equal.

C. otection

a) The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.

b) The contractor shall note in his system drawings, the type and location of these protection devices as well as all wiring information. Such devices are not to be installed above the ceiling.

2.08 INAL CABINETS & JUNCTION BOXES

A. l terminal cabinet and junction boxes are to be provided and installed by the Division 16 Prime Contractor. This contractor and the prime contractor shall coordinate mounting locations prionr to install.

2.09 ide all modules and fiber optic cables to connect main rack to each Node.

PART 3 - EXECUTION

3.01 DIVISION OF WORK

A. While all work included under this specification is the complete responsibility of the contractor, the division of actual work listed following shall occur.

1. All conduits with pull cords, all electrical pull boxes, grounding rods, all outlet boxes, terminal cabinets, backboards, etc., which form part of the rough-in work shall be provided and installed completely by the Division 16 Contractor. Coordinate as necessary for proper installation.

2. The balance of the system, including installation of initiating devices, notification appliances and equipment, making all connections, etc., shall be performed by the System Supplier/Installer.

3. All 120VAC power conductors and conduits associated with power circuits to all low voltage system equipment locations shall be provided and installed by the Division 16 Contractor.

4. An insulated stranded copper ground wire shall be provided from each equipment rack to the building grounding system, in compliance with CEC Article 250, by the Division 16 Contractor.

5. Labeling of pullboxes and terminal cabinets shall be provided and installed by the Division 16 Contractor.

3.02 INSTALLATION

A. All work shall be completed in strict accordance with all applicable codes and ordinances, by a qualified Manufacturer's Authorized Distributor.

B. Cable/Wire

1. All cable/wire for the communications system shall be new.

2. System cable/wire and equipment installation shall be in accordance with good engineering practices as established by the Electronics Industries Alliance (EIA) and the California Electrical Code (CEC). Wiring shall meet all applicable electrical codes. All cable/wire shall test free from all grounds and shorts.

3. All #22AWG and #24AWG connections throughout the system shall be made by spring tension clip "punch block", Siemon type 66 terminals or equal. Conductors #20AWG and larger shall be terminated on barrier screw terminals.

4. All communication system cable/wire shall be labeled at all points of termination. All labeling shall be based on the room numbers as provided by the Owner or his representative.

5. Protection and dressing of cables:

a) Cables mounted on backboards and within equipment racks, etc., shall be grouped and securely attached to the backboard or enclosure in horizontal and vertical bundles in a neat workmanlike manner using Thomas & Betts "Ty-Rap", Panduit cable mounts and Allen-Tel cable management or equal. Edge protection material ("cat-track") shall be installed on edges of holes, lips of ducts or any other point where cables or harnesses cross metallic edge.

6. Shielding:

a) Cable shielding shall be connected to common ground at point of lowest audio level and shall be free from ground at any other point. Cable shields shall be terminated in same manner as conductors.

7. Underground cables

a) Any cable/wire pulled through manholes or pullboxes located below grade shall be continuous with no splices. The cable/wire shall be intact with no cuts in the protective outer jacket.

b) Provide 15% spare pair capacity for multi-pair cabling to each building.

C. Cable/Wire Terminations

1. All splices in above ground junction boxes shall be made on terminal strips.

3.03 SYSTEM START-UP

A. All start-up programming and system commissioning shall be performed by a manufacturer's trained and certified technician.

3.04 SYSTEM VERIFICATION

A. Subsequent to system start-up the system installer shall, at a minimum, verify that the following features are functioning properly.

1. Two way talk-back

2. All call paging

3. Emergency call-in

4. Call switches

5. Verification of call station identifications with room numbers provided by the Owner or his representative.

3.05 ACCEPTANCE TESTING

A. The system installer shall, in the presence of the Inspector of Record (IOR), perform 100% testing as noted in System Verification above.

3.06 DOCUMENTATION

A. Provide the following directly to the Supervisor of Technology Service.

1. Provide a printed copy of all field programming for all components in system.

2. Provide one copy of all diagnostic software with copy of field program for each unit.

3. Provide one copy of all service manuals, parts list, and internal wiring diagrams of each component of system.

4. Provide one copy of all field wiring runs, location and end designation of system.

3.07 MANUFACTURER’S FIELD SERVICES

A. The contractor shall, at the owner's request, make available a service contract offering continuing factory authorized service of this system after the initial warranty period.

B. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.

3.08 IN SERVICE TRAINING

A. In addition to training of District personnel for maintenance of system provide complete "in service" instructions of system operation to school personnel. Minimum duration shall be 8 hours.

B. The Contractor shall instruct personnel designated by the Owner in the proper use, basic care and maintenance of the system beyond the warranty period.

3.09 GUARANTEE AND WARRANTY

A. Guarantee all parts, labor, and workmanship furnished under this contract for the

minimum period of twelve months from the date of substantial completion, or first formal use by the Owner, whichever is last to occur. During the warranty period, report to the site and repair or replace any defective materials or workmanship without cost to the Owner. Non-emergency Warranty service shall be rendered within 24 hours after request by the Owner. Emergency service shall be provided within 8 hours of request by owner. Equivalent replacement equipment shall be temporarily provided when immediate on-site repairs cannot be made. Where warranties on individual pieces of equipment exceed twelve months, the guarantee period shall be extended to the warranty period of the particular items.

B. After completion of the work the Contractor shall submit a Certificate of Warranty, stating commence and expiration dates and conditions of the warranty, for signature of both participating parties. Incremental warranties for completed portions of the work may be negotiated at the discretion of the Owner, if delays occur beyond the control of the Contractor.

3.10 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

A. All work described herein to be done by the manufacturer's authorized representative shall be provided by a documented factory authorized representative of the basic line of equipment to be utilized.

B. As further qualification for bidding and participating in the work under this specification the manufacturer's representative shall hold a valid C-10 Contractor's License issued by the Contractor's State License Board of California. The manufacturer's representative shall have completed at least ten (10) projects of equal scope, giving satisfactory performance and have been in the business of furnishing and installing sound systems of this type for at least five (5) years. The manufacturer's representative shall be capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.

C. The manufacturer's representative shall provide a letter with submittals from the manufacturer of all major equipment stating that the manufacturer's representative is an authorized distributor. This letter shall also state the manufacturer guarantees service performance for the life of the equipment, and that there will always be an authorized distributor assigned to service the area in which the system has been installed.

D. The contractor shall furnish a letter from the manufacturer of the equipment, which certifies that the equipment has been installed according to factory intended practices, that all the components used in the system are compatible and that all new portions of the systems are operating satisfactorily. Further, the contractor shall furnish a written unconditional guarantee, guaranteeing all parts and all labor for a period of one (1) year after final acceptance of the project by the owner.

END OF SECTION

# Appendix C:

# Enrollment Projection Report

# APPENDIX C
# BURBANK SCHOOLS ENROLLMENT FORECASTS

December 20, 2023

Urbanomics, Inc.
www.urbanomics.org

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# Introduction

As part of a larger facilities master planning process, the Burbank Public School District (the District) Urbanomics, Inc. was retained to prepare districtwide and school building-specific enrollment projections by year and grade level for K to 12 enrollment, including unclassified elementary school students, over a ten-year period beginning with School Year 2023-2024 and concluding with School Year 2032-2033. The enrollment projections will include both a baseline forecast based on the historic trend as well as a consensus forecast informed by both historic enrollment and housing development activity recently completed, in the pipeline, proposed, or potentially induced by proposed municipal zoning modifications.

This report presents the socioeconomic context and conditions surrounding current and future enrollment, a description of the data collection and methodologies for the forecasts, as well as both cohort-survival/retention model forecasts, and the real-estate augmented forecasts by school.

# Socioeconomic Context

## Population

As shown in Table 1, the resident population of Los Angeles County and Burbank grew between 2010 and 2020, with the county adding roughly 200,000 (2.0%), to which Burbank contributed some 4,000, an increase of 3.8 percent over the course of the decade. For Burbank, growth in the period has meant increased diversity. While all racial and ethnic groups increased in number, the greatest numeric increases were in residents who identify as "two or more" or "some other" race.

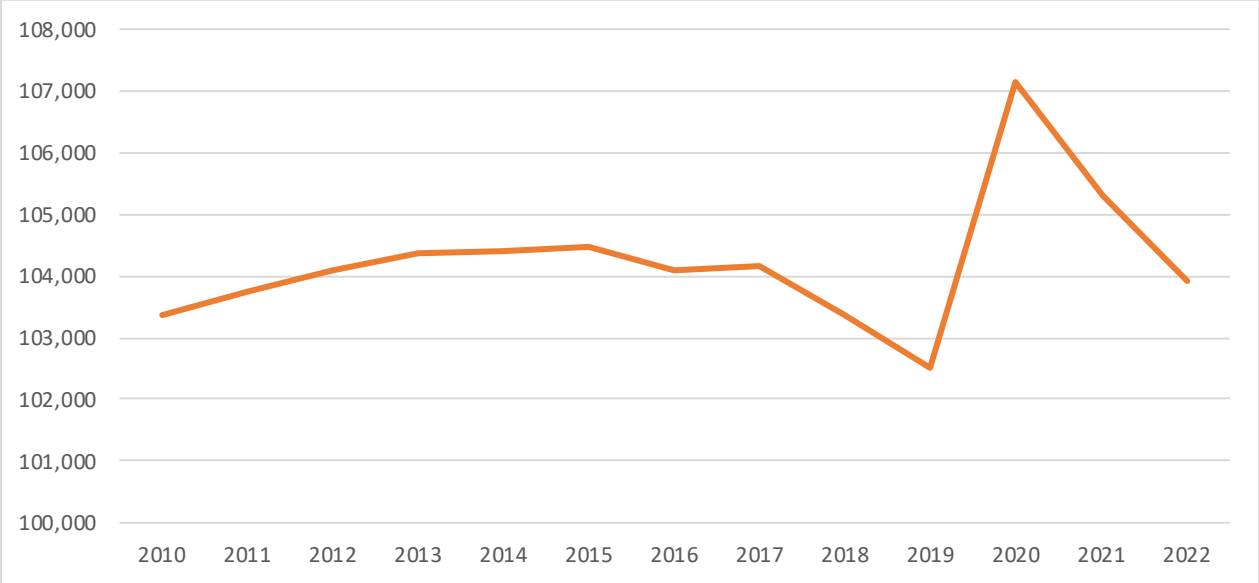
Table 1. Population by Race & Ethnicity Los Angeles County and Burbank: 2010 & 2020

| | Los Angeles County | | | Burbank | | |
|---|---|---|---|---|---|---|
| Population by Race & Ethnicity | 2010 | 2020 | % Change | 2010 | 2020 | % Change |
| Total population | 9,818,605 | 10,014,009 | +2.0% | 103,336 | 107,274 | +3.8% |
| Hispanic or Latino | 4,687,889 | 4,804,763 | +2.5% | 25,310 | 25,953 | +2.5% |
| Not Hispanic or Latino | 5,130,716 | 5,209,246 | +1.5% | 78,026 | 81,321 | +4.2% |
| White alone | 2,728,321 | 2,563,609 | -6.0% | 60,261 | 60,296 | +0.1% |
| Black or African American alone | 815,086 | 760,689 | -6.7% | 2,443 | 2,891 | +18.3% |
| American Indian and Alaska Native alone | 18,886 | 18,453 | -2.3% | 196 | 222 | +13.3% |
| Asian alone | 1,325,671 | 1,474,237 | +11.2% | 11,753 | 12,282 | +4.5% |
| Native Hawaiian and Other Pacific Islander alone | 22,464 | 20,522 | -8.6% | 76 | 98 | +28.9% |
| Some Other Race alone | 25,367 | 58,683 | +131.3% | 249 | 618 | +148.2% |
| Two or More Races | 194,921 | 313,053 | +60.6% | 3,048 | 4,914 | +61.2% |
| Black, Indigenous, People of Color | 7,090,284 | 7,450,400 | +5.1% | 43,075 | 46,978 | +9.1% |

Source: US Bureau of the Census, Decennial Census 2010, 2020

While the county and the municipality have seen growth in the recent past, which corresponded to the onset of the COVID-19 pandemic, population estimates for 2021 and 2022 show a marked decline from the 2020 peak. This trend is expected to continue as forecasts prepared by California's Department of Transportation (CALTRANS) predict long term population declines countywide, in part tied to housing costs.[1]

Figure 1. Burbank, CA Population Estimates 2010-2022




Source: US Bureau of the Census, Annual Population Estimates

The total population is not as significant to the school district as the age distribution of residents. Table 2 presents the median age of resident of Los Angeles County and the Burbank USD area. The median age in Los Angeles County increased from 34.8 to 37.5 between 2010 and 2020. The median age in Burbank increased from 38.9 to 40.4. The median age for women is greater than the population overall. In 2020, the median age for women was 38.7 and 41.4 in Los Angeles County and Burbank, respectively.

Table 2. Population by Race & Ethnicity Los Angeles County and Burbank: 2010 & 2020

| | Los Angeles County | | | Burbank USD | | |
|---|---|---|---|---|---|---|
| MEDIAN AGE BY SEX | 2010 | 2020 | % Change | 2010 | 2020 | % Change |
| Both sexes | 34.8 | 37.5 | +7.8% | 38.9 | 40.4 | +3.9% |
| Male | 33.6 | 36.4 | +8.3% | 37.8 | 39.3 | +4.0% |
| Female | 35.9 | 38.7 | +7.8% | 40 | 41.4 | +3.5% |

Source: US Bureau of the Census, Decennial Census 2010, 2020

[1] https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/data-analytics-services/transportation-economics/socioeconomic-forecasts/2022/los-angeles-2022-a11y.pdf

The increasing median age is not only due to the Baby Boom generation aging in place; the bottom of the population pyramid is shrinking. As shown in Table 3, between 2010 and 2020, every childhood age group saw decreases in total numbers, not only in Burbank, but in Los Angeles County as a whole.

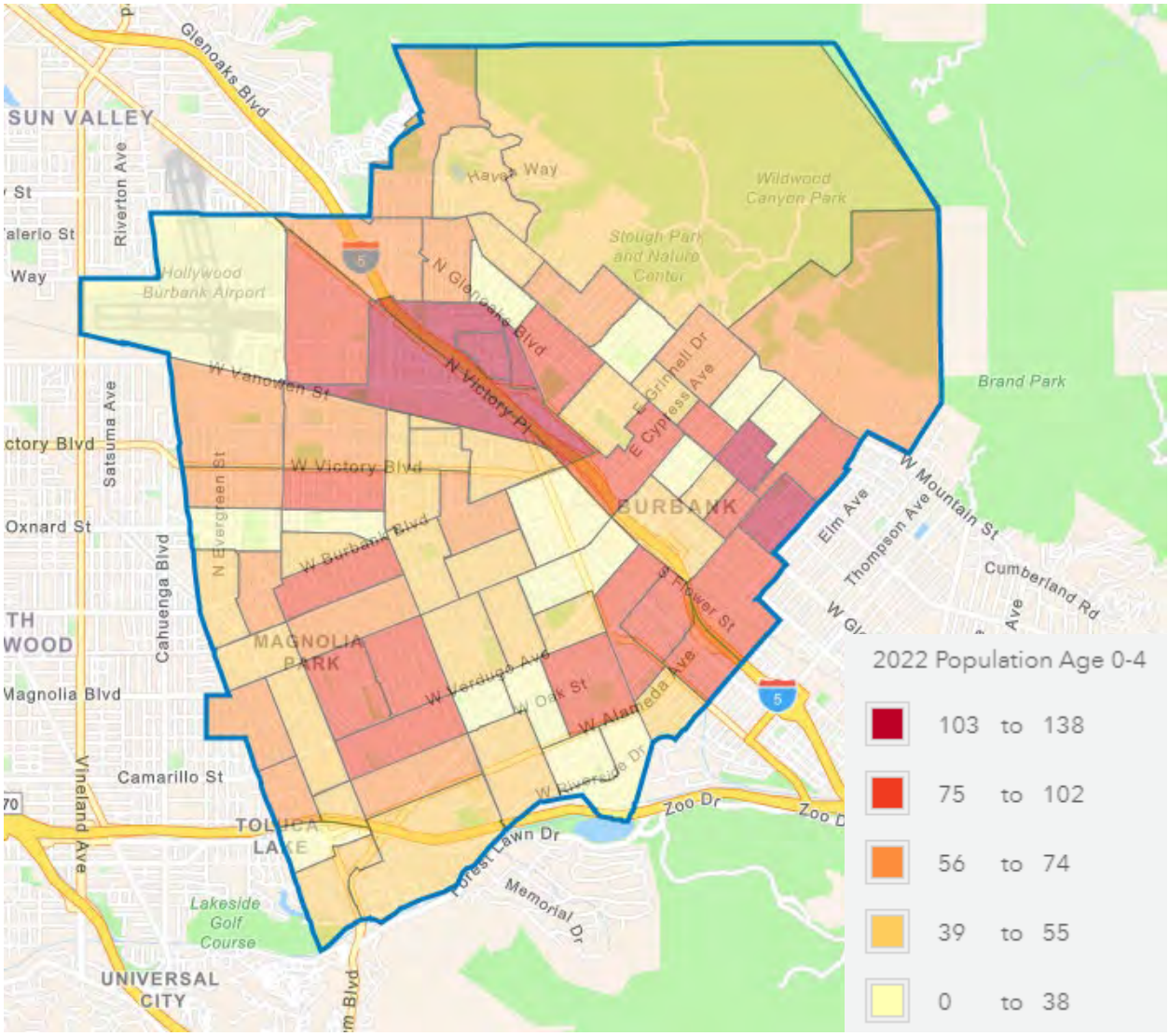
Table 3. Population by Race & Ethnicity Los Angeles County and Burbank: 2010 & 2020

| | Los Angeles County | | | Burbank USD | | |
|---|---|---|---|---|---|---|
| Population by Age | 2010 | 2020 | % Change | 2010 | 2020 | % Change |
| Under 5 years | 645,793 | 558,298 | -13.5% | 5,134 | 4,826 | -6.0% |
| 5 to 9 years | 633,690 | 618,897 | -2.3% | 5,301 | 5,277 | -0.5% |
| 10 to 14 years | 678,845 | 643,025 | -5.3% | 5,889 | 5,445 | -7.5% |
| 15 to 18 years | 598,316 | 505,905 | -15.4% | 5,424 | 4,474 | -17.5% |

Source: US Bureau of the Census, Decennial Census 2010, 2020

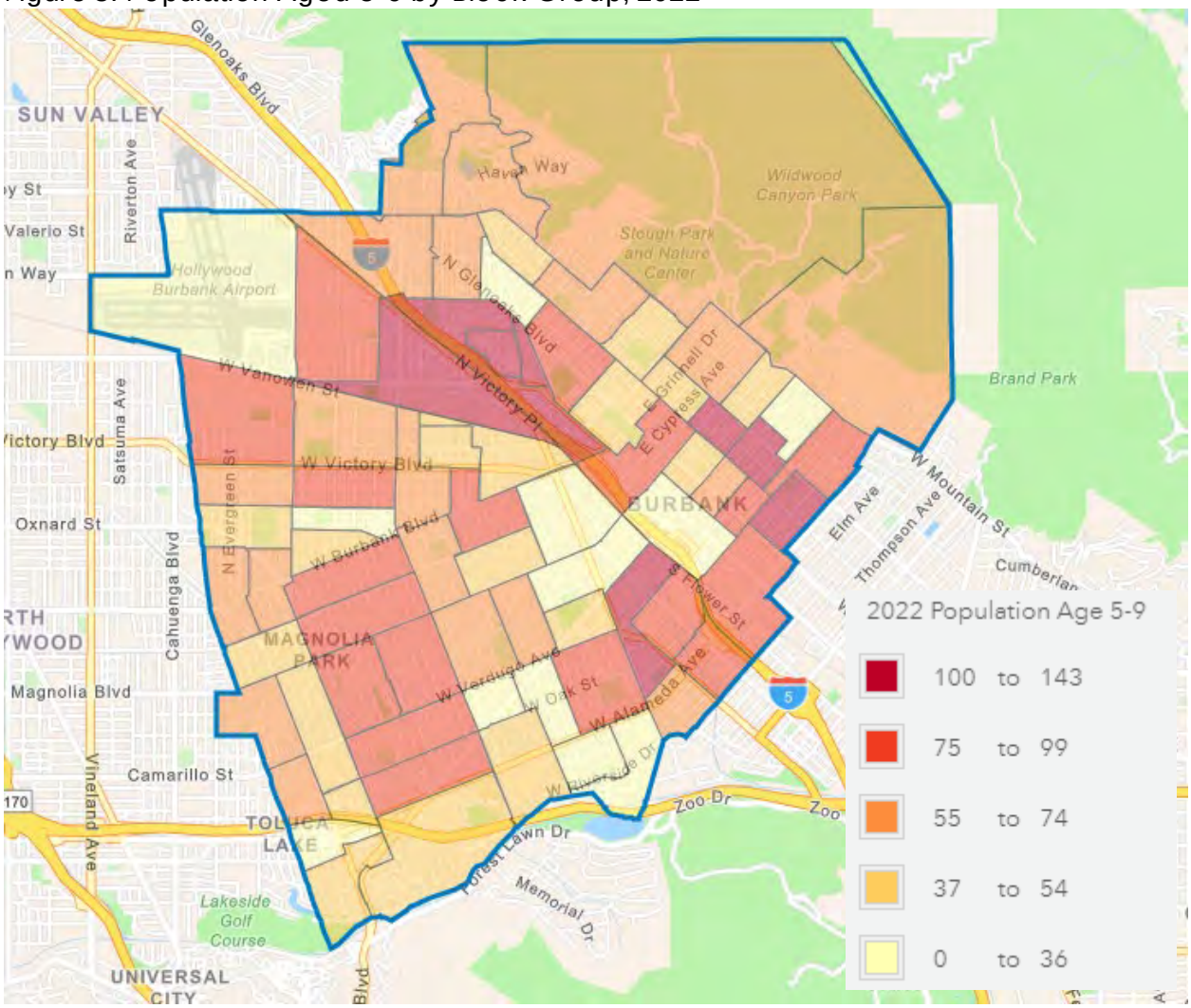
As shown in the maps on the following pages, the distribution of children by age cohort across the District follows very similar patterns.

Figure 2: Population Aged <5 by Block Group, 2022



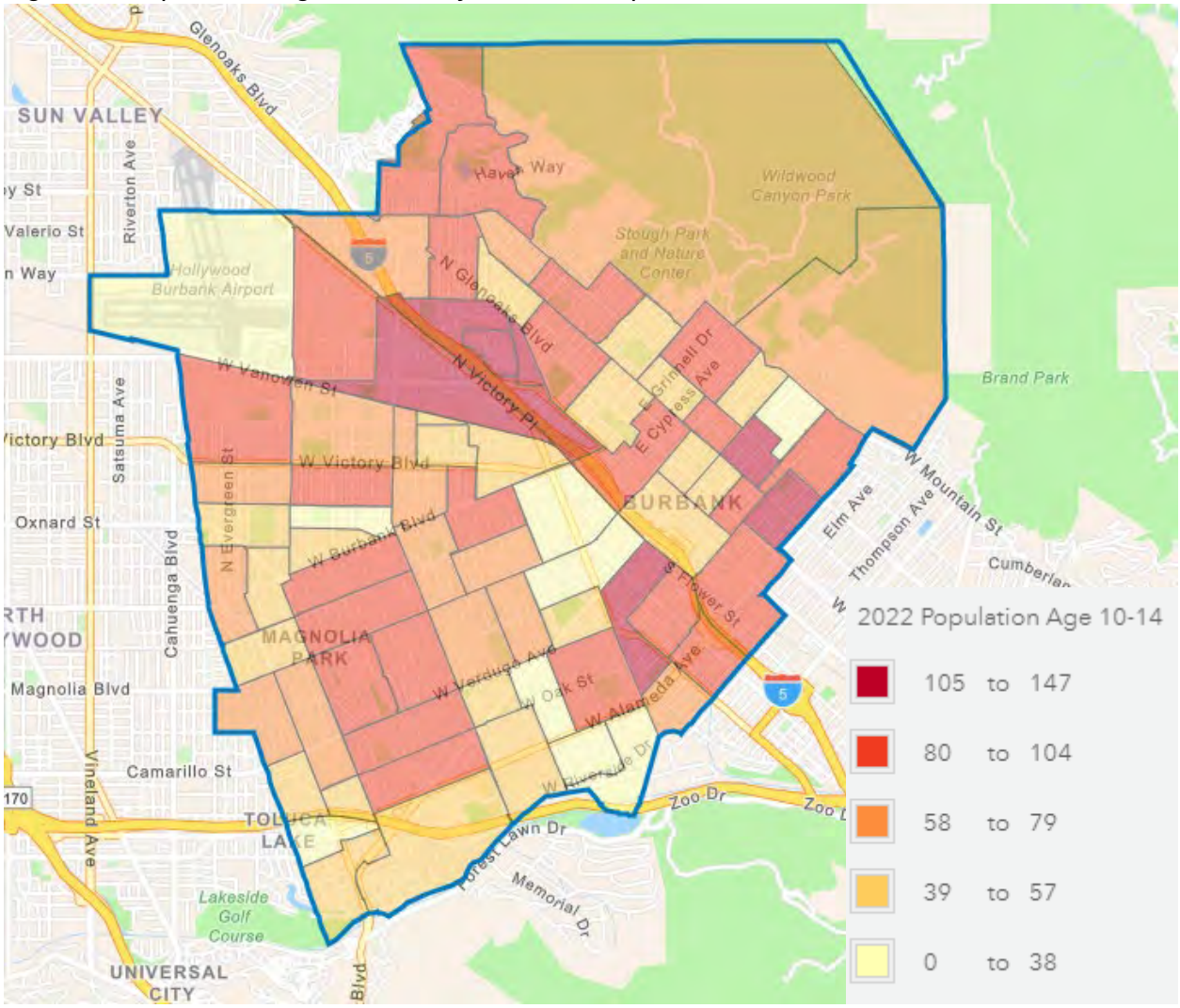

*Source: ESRI Business Analyst, 2023.*

Figure 3: Population Aged 5-9 by Block Group, 2022



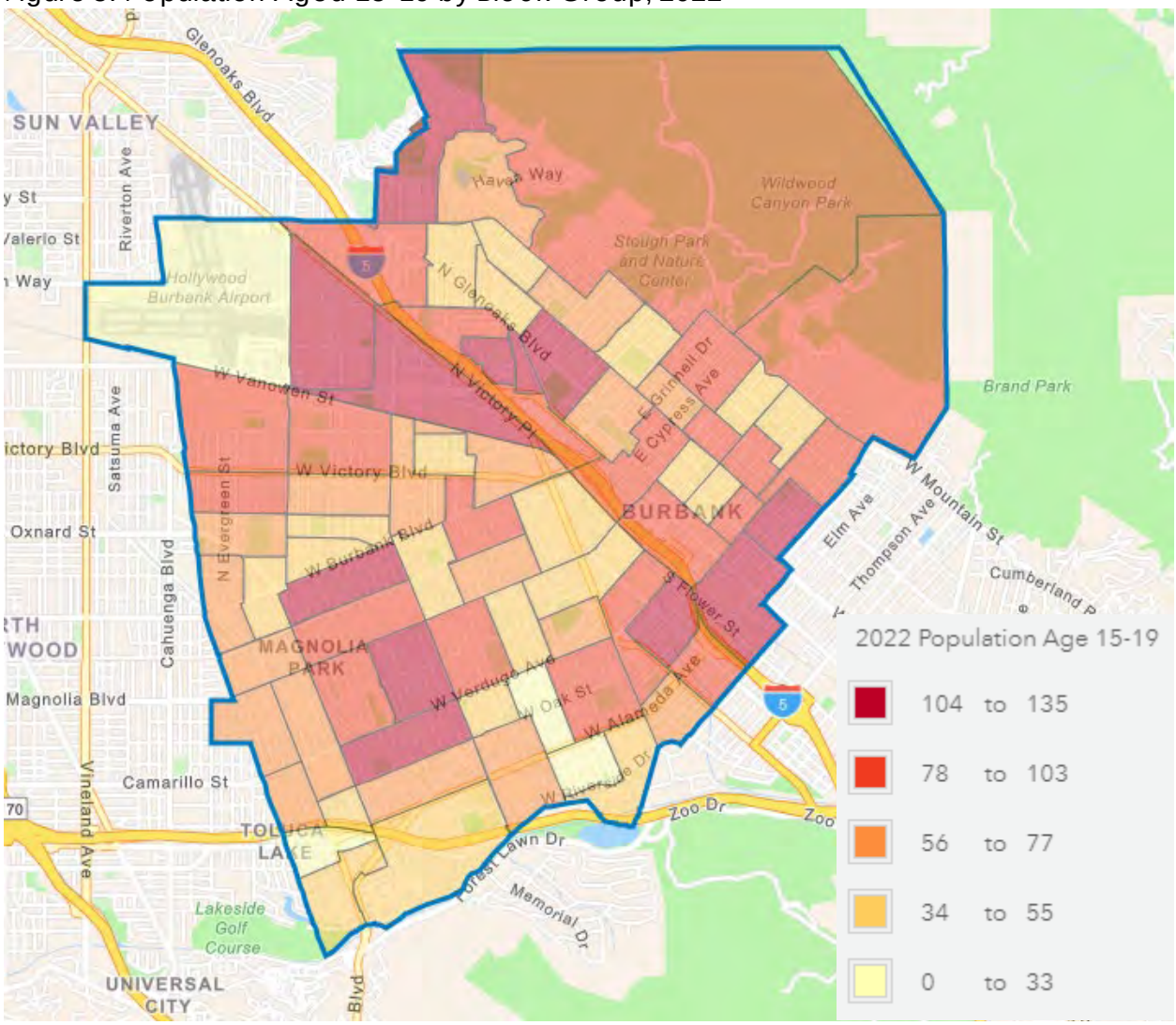

*Source: ESRI Business Analyst, 2023.*

Figure 4: Population Aged 10-14 by Block Group, 2022




*Source: ESRI Business Analyst, 2023.*

Figure 5: Population Aged 15-19 by Block Group, 2022




*Source: ESRI Business Analyst, 2023.*

### Housing

One of the key factors contributing to population growth is housing availability.

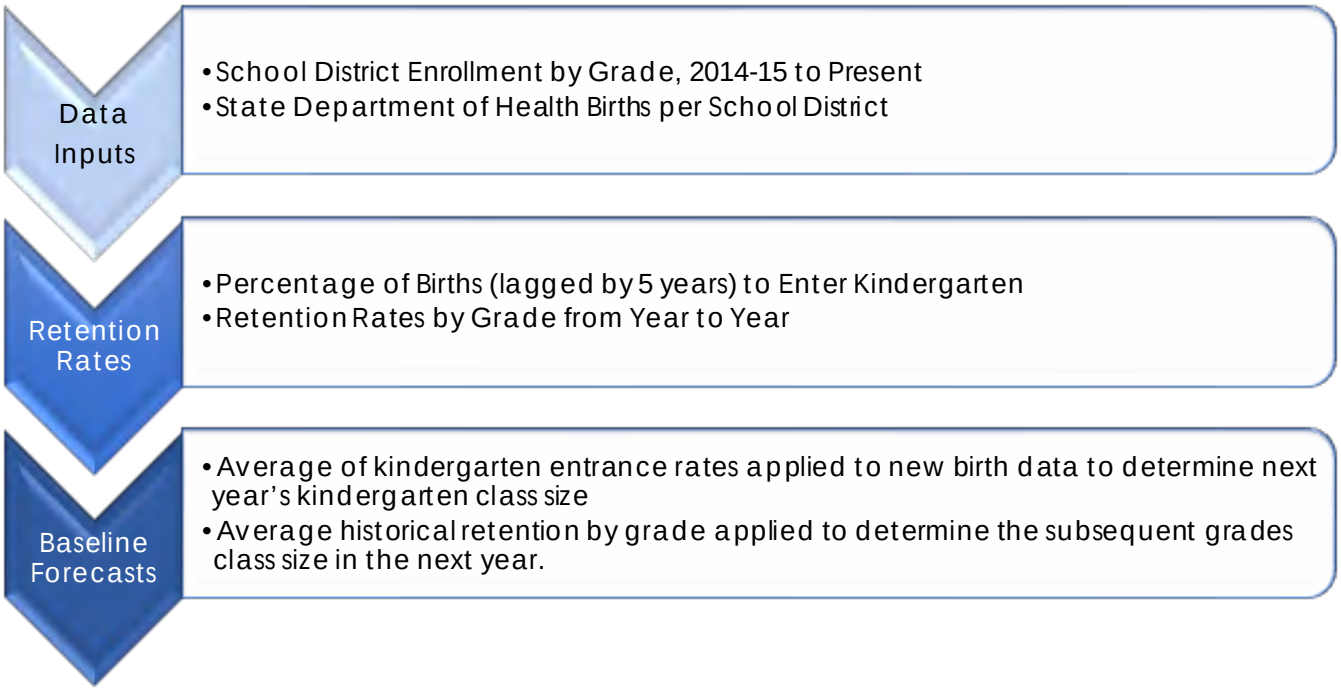
Table 4. Population by Race & Ethnicity Los Angeles County and Burbank: 2010 & 2020

| | Los Angeles County | | | Burbank USD | | |
|---|---|---|---|---|---|---|
| Housing Tenure | 2010 | 2020 | % Change | 2010 | 2020 | % Change |
| Total housing units | 3,445,076 | 3,591,981 | +4.3% | 44,307 | 45,598 | +2.9% |
| Owner-occupied housing units | 1,544,749 | 1,559,144 | +0.9% | 18,463 | 18,289 | -0.9% |
| Renter-occupied housing units | 1,696,455 | 1,861,484 | +9.7% | 23,475 | 25,344 | +8.0% |

## Data Collection and Methodology

### Cohort-Survival/Retention Modeling

The graphic above shows the progression of the School District Enrollment Forecasts.



Historical data and assumptions for the enrollment forecasts are as follows:

- Births:
  - Historical births for all mothers residing in the zip codes that make up the Burbank USD were collected from the California State Department of Health for 2000-2021; projected to 2032
  - Kindergarten enrollment is dependent upon annual births of 5 years before the school year
    - Births for calendar years (CY) 2010 to 2021 (historical period school years correspond to (SY) 2015-16 to 2026-27)
    - Births 2022-2029 held at 2021 levels to inform forecast years through 2034-35.

- Total Enrollment:
  - Public School enrollment was collected for mid-October from the Burbank USD reports of all students on roll by grade.

## Demographic Data

### Births

The California Department of Health provides birth data by place of residence through 2021. These data indicate that Burbank, Los Angeles County and California are following national and global trends of declining fertility and birth rates. See Table 6

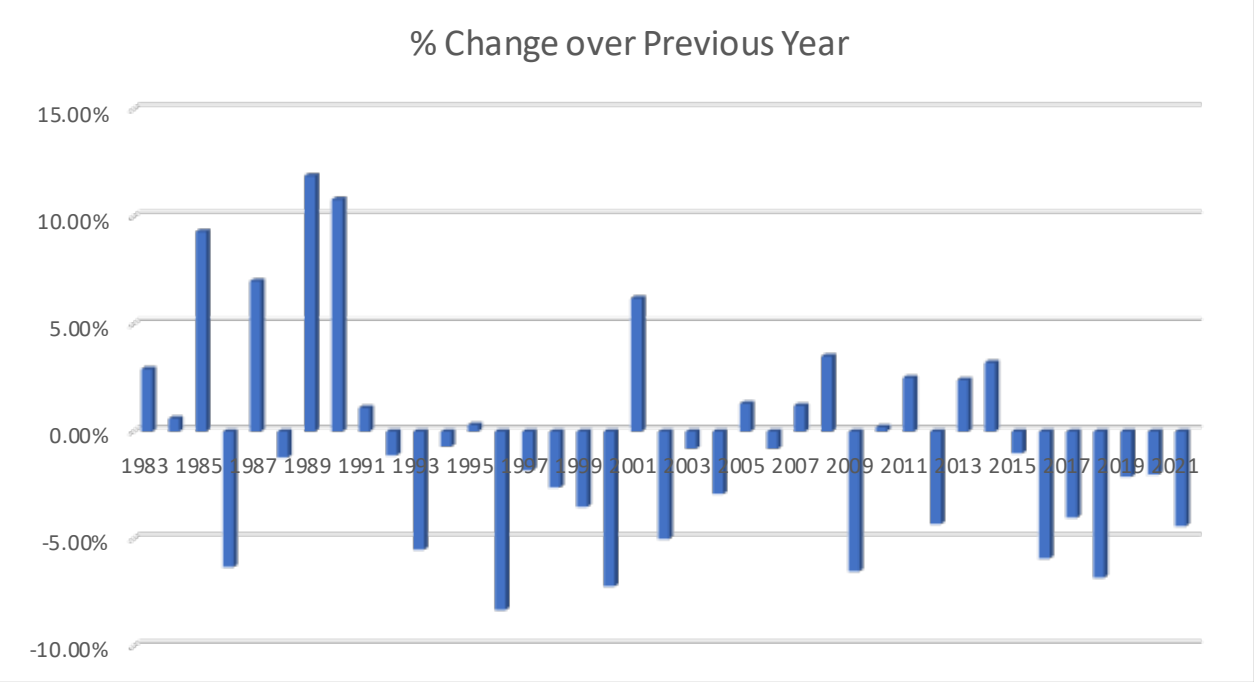
Table 6. Change in Births by 5-Year Perion Burbank, Los Angeles County, California: 1990-2021

| Total Births, Change by 5 Year Period | Burbank | Los Angeles County | Statewide |
|---|---|---|---|
| 1990-1994 | -6.2% | -11.6% | -7.3% |
| 1995-1999 | -15.3% | -10.7% | -6.0% |
| 2000-2004 | -2.8% | -3.7% | +2.5% |
| 2005-2009 | -2.8% | -7.1% | -4.0% |
| 2010-2014 | +3.7% | -2.3% | -1.4% |
| 2015-2019 | -17.5% | -14.0% | -9.2% |
| 2020-2021 | -4.4% | -1.9% | +0.1% |

Source: California Department of Health

Figure 6 presents the year-over-year change in births for the zip codes that make up the Burbank USD. Birth rates have been declining since 1990, with few exceptions.

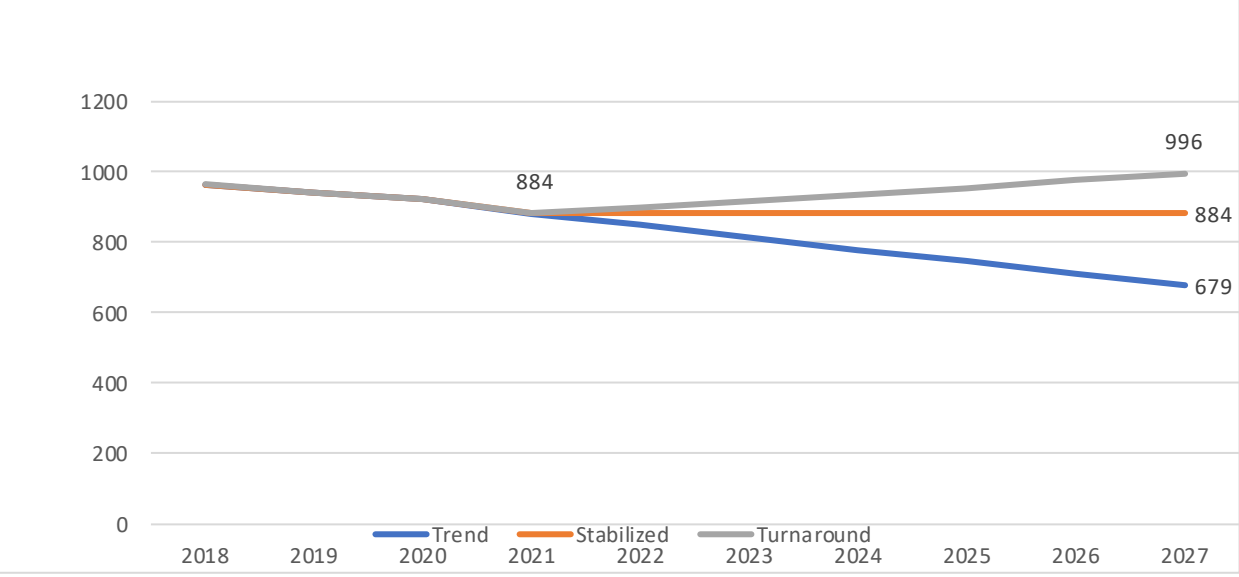
Figure 6. Year-over-year Change in Births in Burbank USD Zip Codes: 1983-2021




Source: California Department of Health

As outlined previously, in the retention model description, birth data are inputted at a five-year lag. Historical data are only available through 2021, so projections of births must be made to provide inputs to the model for the 2027-28 to the 2034-35 school years. The options included a baseline trend projection, holding birth rates level at the 2021 number or assuming a 2 percent per annum turnaround in birth rates (which would reflect a high-growth housing development scenario), as shown in Figure 7.

Figure 7. Burbank USD Zip Code Births, Historical and Forecasts

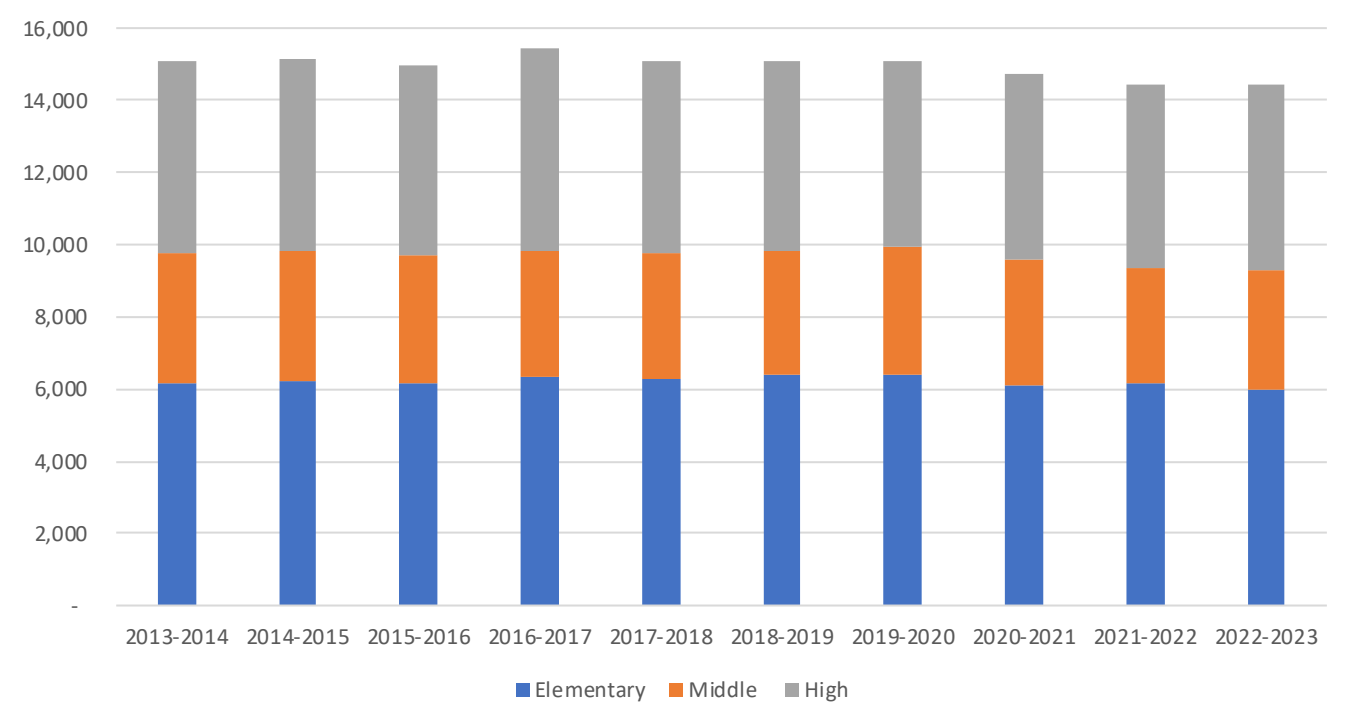


It was decided that given the significant long-range trends as well as the regional population projections, the number of births would be held constant at 2021 levels for the forecasts. These are referred to as the Stabilized forecasts.

## Enrollment Data

The Burbank USD provided enrollment data by school for the years 2013-14 to 2022-23 . Districtwide enrollment increased steadily from 2014-15 to 2019-20 before declining slightly during the pandemic. As shown in Figure 9, middle and high school level enrollment have driven the increases in the recent past. There has been a slight decline in elementary enrollment, however given the upward trending birth rates, this trend is likely to reverse.

Figure 8. Burbank USD Enrollment by Level, 2013-14 to 2022-23




Source: Burbank USD

## Special Considerations: TK, Transfers

The State of California established a Transitional Kindergarten (TK) Program to bridge the gap between pre-school and kindergarten. As a result, beginning in the 2015-16 school year a new TK level was included as a second year of kindergarten enrollment. For the sake of enrollment modeling, retention rates from birth to entry are proportionally divided between TK and kindergarten.

Burbank USD allows the children of municipal workers to transfer into District schools. These transfers are captured in annual retention rates and are likely to remain consistent unless the eligible workforce is dramatically increased.

## Retention Rates

The driver of the cohort survival/retention model are the retention rates from grade to grade. These are computed for grades 1-12 by dividing the number of children in a grade in a given year by the number of children in the preceding grade in the preceding year.

For TK and Kindergarten entries into the public school system, a "retention rate" was determined by dividing the number of kindergarten+TK students by the number of births in the school district five years earlier.

Figure 9 shows the historical section of the district retention model for reference. The key factor of note is that in 10 years of data, retention rates for all grades up until high school hover at or slightly above 100 percent, reflecting transfers into the district.

Figure 9: Burbank USD Enrollment by Level, 2013-14 to 2022-23

DISTRICT NAME: **Burbank Unified School District**
COUNTY: Los Angeles
SCHOOL: Districtwide Total

| School Year | Births 5 Yrs. Ago | | TK | K | 1st Gr. | 2nd Gr. | 3rd Gr. | 4th Gr. | 5th Gr. | 6th Gr. | 7th Gr. | 8th Gr. | 9th Gr. | 10th Gr. | 11th Gr. | 12th Gr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | | |
| 2013-2014 | 1,189 | 0.897 | - | 1,066 | 958 | 1,027 | 959 | 1,054 | 1,102 | 1,171 | 1,198 | 1,209 | 1,373 | 1,358 | 1,326 | 1,255 |
| | | | | 0.952 | 1.047 | 1.019 | 1.041 | 1.000 | 1.095 | 1.038 | 0.997 | 1.136 | 1.001 | 0.955 | 0.965 | |
| 2014-2015 | 1,112 | 0.978 | - | 1,088 | 1,015 | 1,003 | 1,047 | 998 | 1,054 | 1,207 | 1,215 | 1,195 | 1,374 | 1,374 | 1,297 | 1,279 |
| | | | | 0.907 | 0.983 | 1.017 | 1.018 | 0.999 | 1.070 | 1.026 | 0.993 | 1.122 | 1.000 | 0.952 | 0.953 | |
| 2015-2016 | 1,114 | 0.978 | 187 | 903 | 987 | 998 | 1,020 | 1,066 | 997 | 1,128 | 1,238 | 1,206 | 1,341 | 1,374 | 1,308 | 1,236 |
| | | | | 1.071 | 1.008 | 1.036 | 1.024 | 1.015 | 1.080 | 1.035 | 1.014 | 1.143 | 1.030 | 1.025 | 1.102 | |
| 2016-2017 | 1,142 | 1.055 | 192 | 1,013 | 967 | 995 | 1,034 | 1,044 | 1,082 | 1,077 | 1,167 | 1,255 | 1,379 | 1,381 | 1,409 | 1,442 |
| | | | | 1.064 | 1.000 | 1.023 | 1.023 | 1.003 | 1.052 | 1.048 | 1.020 | 1.089 | 0.999 | 0.949 | 0.920 | |
| 2017-2018 | 1,093 | 1.026 | 190 | 931 | 1,078 | 967 | 1,018 | 1,058 | 1,047 | 1,138 | 1,129 | 1,190 | 1,367 | 1,378 | 1,311 | 1,296 |
| | | | | 1.076 | 1.015 | 1.020 | 1.027 | 1.015 | 1.083 | 1.051 | 1.000 | 1.129 | 1.007 | 0.956 | 0.947 | |
| 2018-2019 | 1,119 | 1.049 | 212 | 962 | 1,002 | 1,094 | 986 | 1,045 | 1,074 | 1,134 | 1,196 | 1,129 | 1,344 | 1,377 | 1,318 | 1,241 |
| | | | | 1.046 | 1.001 | 1.023 | 0.987 | 1.000 | 1.060 | 1.051 | 1.006 | 1.108 | 0.987 | 0.970 | 0.967 | |
| 2019-2020 | 1,155 | 1.070 | 228 | 1,008 | 1,006 | 1,003 | 1,119 | 973 | 1,045 | 1,138 | 1,192 | 1,203 | 1,251 | 1,327 | 1,336 | 1,275 |
| | | | | 0.987 | 0.997 | 0.969 | 0.991 | 0.986 | 1.054 | 1.007 | 0.989 | 1.093 | 1.006 | 0.969 | 0.973 | |
| 2020-2021 | 1,144 | 0.935 | 188 | 882 | 995 | 1,003 | 972 | 1,109 | 959 | 1,101 | 1,146 | 1,179 | 1,315 | 1,259 | 1,286 | 1,300 |
| | | | | 1.048 | 0.992 | 0.995 | 0.990 | 0.995 | 1.042 | 0.999 | 0.996 | 1.124 | 0.983 | 0.970 | 0.963 | |
| 2021-2022 | 1,077 | 1.075 | 209 | 949 | 924 | 987 | 998 | 962 | 1,104 | 999 | 1,100 | 1,141 | 1,325 | 1,293 | 1,221 | 1,238 |
| | | | | 1.021 | 0.969 | 0.990 | 0.968 | 1.014 | 1.047 | 1.053 | 1.022 | 1.152 | 1.000 | 1.012 | 1.000 | |
| 2022-2023 | 1,034 | 1.140 | 300 | 879 | 969 | 895 | 977 | 966 | 975 | 1,156 | 1,052 | 1,124 | 1,315 | 1,325 | 1,308 | 1,221 |

*Source: Burbank Public Schools; Urbanomics.*

## Enrollment Projection Methodologies

Methodology 1: 8-Year Average. An average of the retention rates derived from all eight years of historical data was used to create the baseline enrollment forecast.

In keeping with industry standards, variations of the enrollment forecasts were prepared using 1-year, 3-year, and 5-year average retention rates as well. All retention rates are applied to prior year and prior grade enrollment, with the exception of TK-K grade levels for which retention rates are applied to corresponding rows birth rates.

Methodology 2: 1-Year Retention Rates. The retention rate derived from the 2020-21 and 2021-22 school year enrollment by grade was applied to each subsequent set of prior year/prior grade enrollment estimates.

Methodology 3: 3-Year Average Retention Rates. An average of the three most recent years' retention rates was applied to yield the subsequent year's enrollment by grade.

Methodology 4: 5-Year Average Retention Rates. An average of the five most recent years' retention rates was applied to yield the subsequent year's enrollment by grade.

Figure 10 on the following page shows an example of the forecast spreadsheet, with embedded retention rates.

## Figure 10: Cohort Survival/Retention Worksheet

DISTRICT NAME: **Burbank Unified School District**

COUNTY: Los Angeles

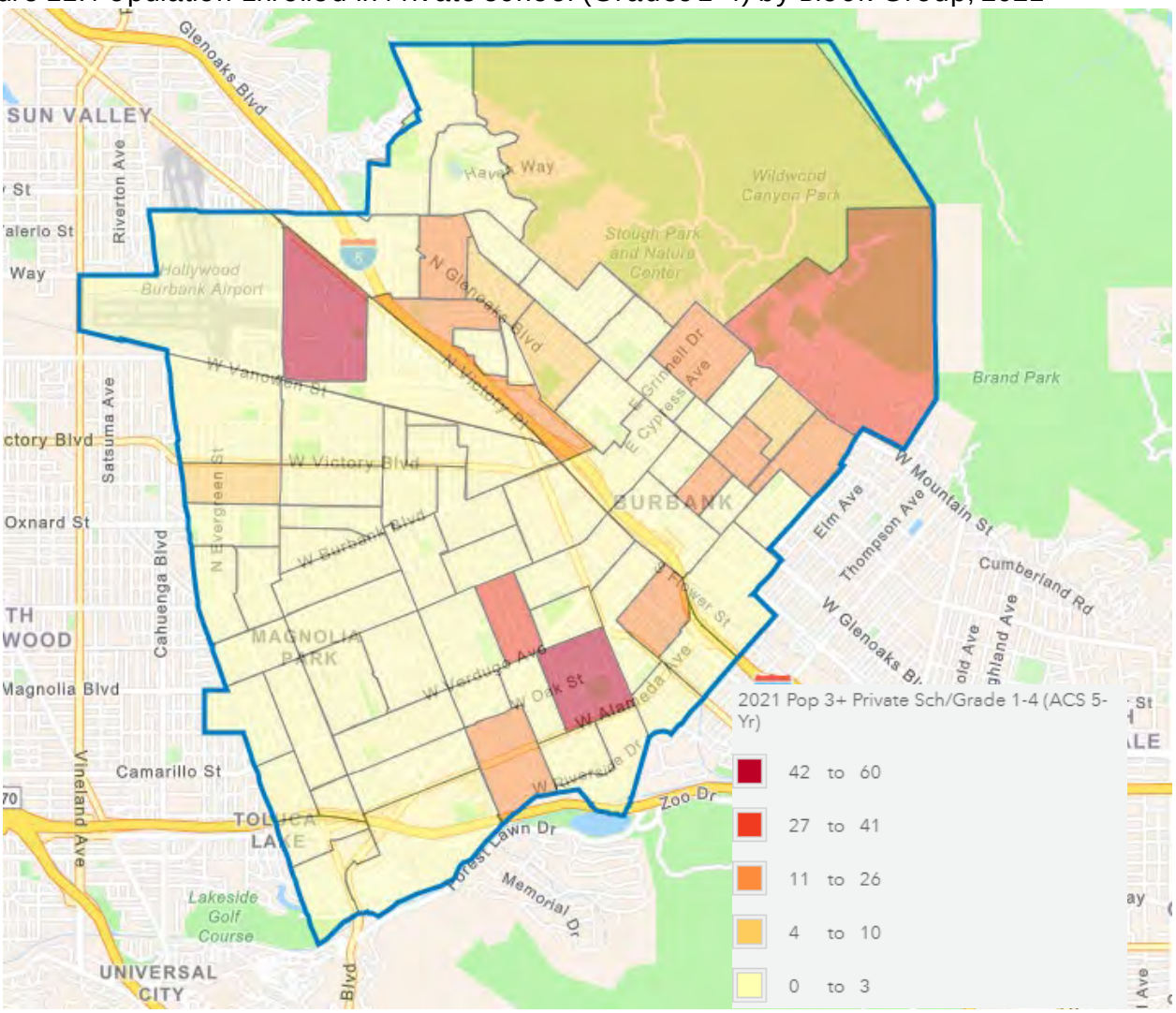
SCHOOL: Districtwide Total

| School Year | Births 5 Yrs. Ago | | TK | K | 1st Gr. | 2nd Gr. | 3rd Gr. | 4th Gr. | 5th Gr. | 6th Gr. | 7th Gr. | 8th Gr. | 9th Gr. | 10th Gr. | 11th Gr. | 12th Gr. | Total K-12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HISTORIC DATA** | | | | | | | | | | | | | | | | | |
| 2013-2014 | 1,189 | 0.897 | - | 1,066 | 958 | 1,027 | 959 | 1,054 | 1,102 | 1,171 | 1,198 | 1,209 | 1,373 | 1,358 | 1,326 | 1,255 | 15,056 |
| | | | | 0.952 | 1.047 | 1.019 | 1.041 | 1.000 | | 1.095 | 1.038 | 0.997 | 1.136 | 1.001 | 0.955 | 0.965 | |
| 2014-2015 | 1,112 | 0.978 | - | 1,088 | 1,015 | 1,003 | 1,047 | 998 | 1,054 | 1,207 | 1,215 | 1,195 | 1,374 | 1,374 | 1,297 | 1,279 | 15,146 |
| | | | | 0.907 | 0.983 | 1.017 | 1.018 | 0.999 | | 1.070 | 1.026 | 0.993 | 1.122 | 1.000 | 0.952 | 0.953 | |
| 2015-2016 | 1,114 | 0.978 | 187 | 903 | 987 | 998 | 1,020 | 1,066 | 997 | 1,128 | 1,238 | 1,206 | 1,341 | 1,374 | 1,308 | 1,236 | 14,989 |
| | | | | 1.071 | 1.008 | 1.036 | 1.024 | 1.015 | | 1.080 | 1.035 | 1.014 | 1.143 | 1.030 | 1.025 | 1.102 | |
| 2016-2017 | 1,142 | 1.055 | 192 | 1,013 | 967 | 995 | 1,034 | 1,044 | 1,082 | 1,077 | 1,167 | 1,255 | 1,379 | 1,381 | 1,409 | 1,442 | 15,437 |
| | | | | 1.064 | 1.000 | 1.023 | 1.023 | 1.003 | | 1.052 | 1.048 | 1.020 | 1.089 | 0.999 | 0.949 | 0.920 | |
| 2017-2018 | 1,093 | 1.026 | 190 | 931 | 1,078 | 967 | 1,018 | 1,058 | 1,047 | 1,138 | 1,129 | 1,190 | 1,367 | 1,378 | 1,311 | 1,296 | 15,098 |
| | | | | 1.076 | 1.015 | 1.020 | 1.027 | 1.015 | | 1.083 | 1.051 | 1.000 | 1.129 | 1.007 | 0.956 | 0.947 | |
| 2018-2019 | 1,119 | 1.049 | 212 | 962 | 1,002 | 1,094 | 986 | 1,045 | 1,074 | 1,134 | 1,196 | 1,129 | 1,344 | 1,377 | 1,318 | 1,241 | 15,114 |
| | | | | 1.046 | 1.001 | 1.023 | 0.987 | 1.000 | | 1.060 | 1.051 | 1.006 | 1.108 | 0.987 | 0.970 | 0.967 | |
| 2019-2020 | 1,155 | 1.070 | 228 | 1,008 | 1,006 | 1,003 | 1,119 | 973 | 1,045 | 1,138 | 1,192 | 1,203 | 1,251 | 1,327 | 1,336 | 1,275 | 15,104 |
| | | | | 0.987 | 0.997 | 0.969 | 0.991 | 0.986 | | 1.054 | 1.007 | 0.989 | 1.093 | 1.006 | 0.969 | 0.973 | |
| 2020-2021 | 1,144 | 0.935 | 188 | 882 | 995 | 1,003 | 972 | 1,109 | 959 | 1,101 | 1,146 | 1,179 | 1,315 | 1,259 | 1,286 | 1,300 | 14,694 |
| | | | | 1.048 | 0.992 | 0.995 | 0.990 | 0.995 | | 1.042 | 0.999 | 0.996 | 1.124 | 0.983 | 0.970 | 0.963 | |
| 2021-2022 | 1,077 | 1.075 | 209 | 949 | 924 | 987 | 998 | 962 | 1,104 | 999 | 1,100 | 1,141 | 1,325 | 1,293 | 1,221 | 1,238 | 14,450 |
| | | | | 1.021 | 0.969 | 0.990 | 0.968 | 1.014 | | 1.047 | 1.053 | 1.022 | 1.152 | 1.000 | 1.012 | 1.000 | |
| 2022-2023 | 1,034 | 1.140 | 300 | 879 | 969 | 895 | 977 | 966 | 975 | 1,156 | 1,052 | 1,124 | 1,315 | 1,325 | 1,308 | 1,221 | 14,462 |
| **PROJECTIONS** | | | | | 1.036 | 0.995 | 0.999 | 0.992 | 1.002 | 1.057 | 1.032 | 1.002 | 1.121 | 0.997 | 0.975 | 0.970 | |
| 2023-2024 | 964 | 1.054 | 261 | 758 | 1007 | 967 | 897 | 973 | 971 | 1034 | 1196 | 1058 | 1263 | 1314 | 1295 | 1272 | 14,264 |
| 2024-2025 | 944 | 1.054 | 256 | 742 | 870 | 1004 | 969 | 893 | 977 | 1029 | 1070 | 1202 | 1189 | 1262 | 1284 | 1259 | 14,008 |
| 2025-2026 | 925 | 1.054 | 267 | 776 | 918 | 934 | 1072 | 1030 | 963 | 1101 | 1130 | 1141 | 1416 | 1253 | 1299 | 1314 | 14,614 |
| 2026-2027 | 884 | 1.054 | 241 | 698 | 895 | 919 | 940 | 1070 | 1039 | 1025 | 1143 | 1140 | 1286 | 1419 | 1229 | 1267 | 14,311 |
| 2027-2028 | 884 | 1.054 | 242 | 703 | 812 | 903 | 932 | 946 | 1085 | 1111 | 1071 | 1160 | 1292 | 1295 | 1397 | 1206 | 14,155 |
| 2028-2029 | 884 | 1.054 | 239 | 693 | 804 | 808 | 903 | 925 | 948 | 1147 | 1147 | 1074 | 1300 | 1288 | 1263 | 1355 | 13,893 |
| 2029-2030 | 884 | 1.054 | 239 | 693 | 793 | 800 | 807 | 896 | 927 | 1002 | 1184 | 1150 | 1204 | 1296 | 1256 | 1225 | 13,472 |
| 2030-2031 | 884 | 1.054 | 239 | 693 | 793 | 789 | 800 | 801 | 897 | 980 | 1034 | 1187 | 1289 | 1201 | 1264 | 1218 | 13,185 |
| 2031-2032 | 884 | 1.054 | 239 | 693 | 793 | 789 | 788 | 793 | 803 | 949 | 1011 | 1037 | 1331 | 1285 | 1171 | 1226 | 12,909 |
| 2032-2033 | 884 | 1.054 | 239 | 693 | 793 | 789 | 788 | 782 | 795 | 848 | 979 | 1014 | 1163 | 1327 | 1254 | 1136 | 12,600 |

## Private School Enrollment

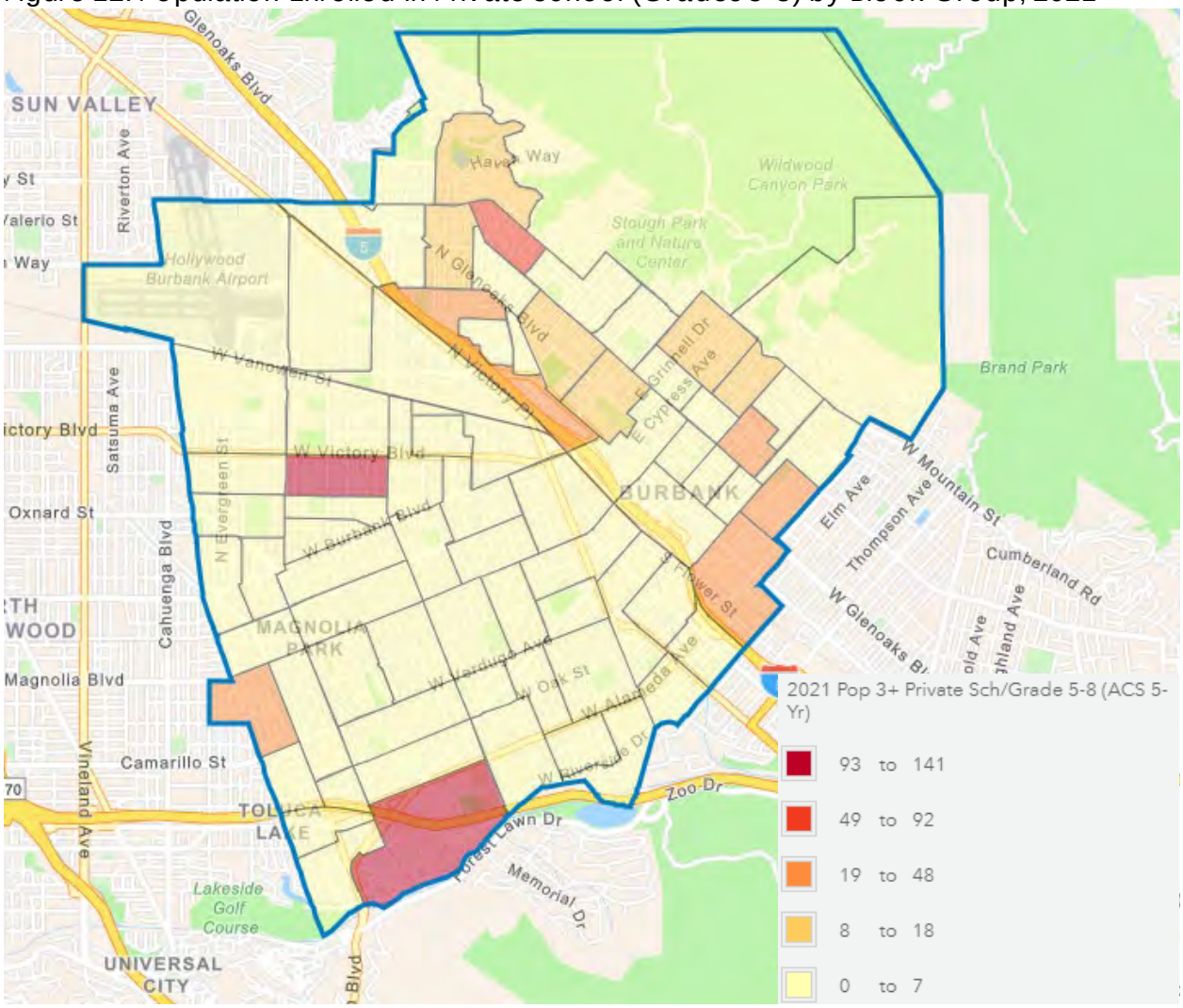
It should be noted that these forecasts reflect only Public School Enrollment. In addition to the public schools, there are 17 private schools in the Burbank area, private school attendance is not restricted by District. Figures 11-13 on the following pages, map the areas of residence of District children attending private school.

Figure 11: Population Enrolled in Private School (Grades 1-4) by Block Group, 2021



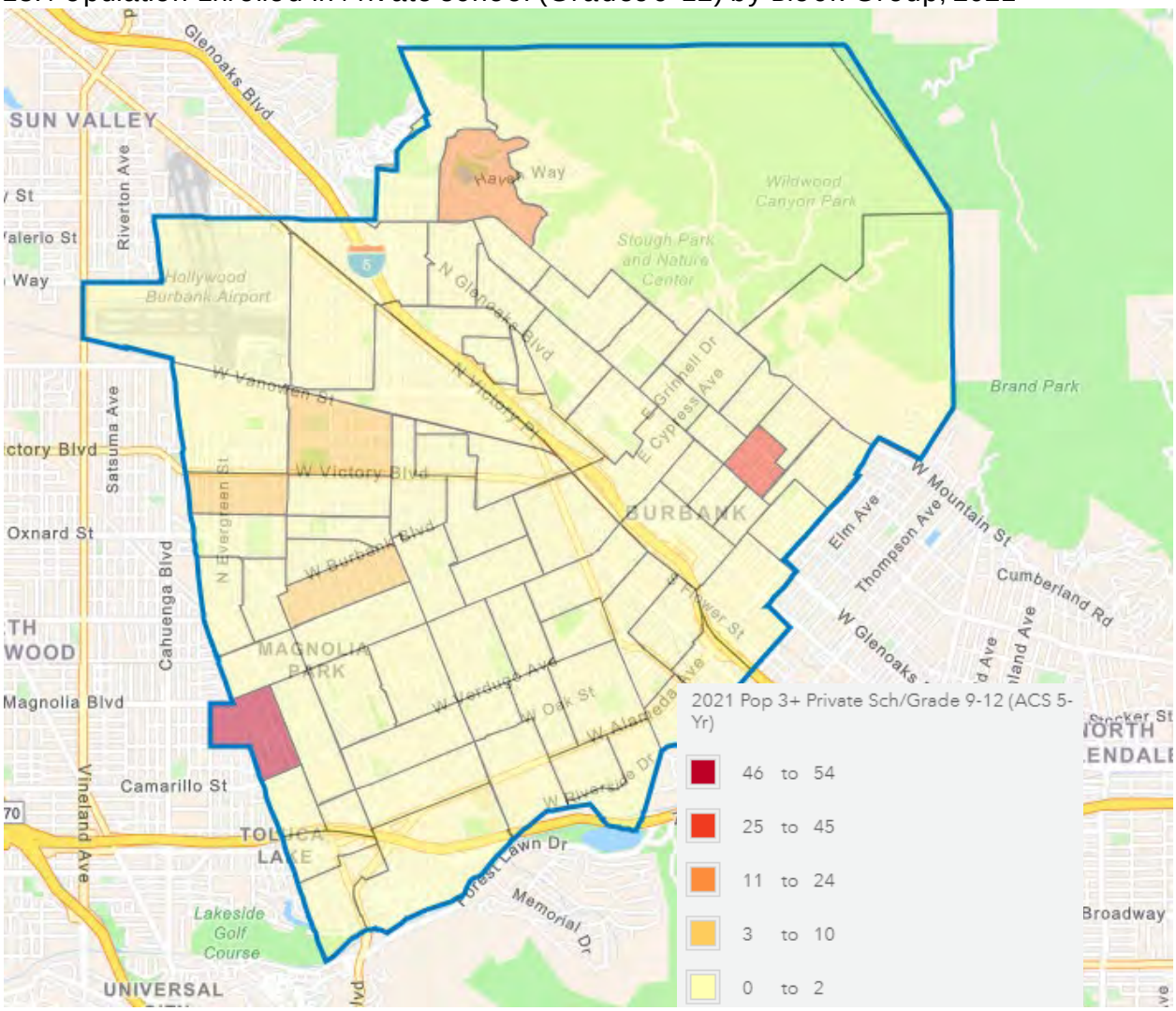

*Source: ESRI Business Analyst, 2023.*

Figure 12. Population Enrolled in Private School (Grades 5-8) by Block Group, 2021



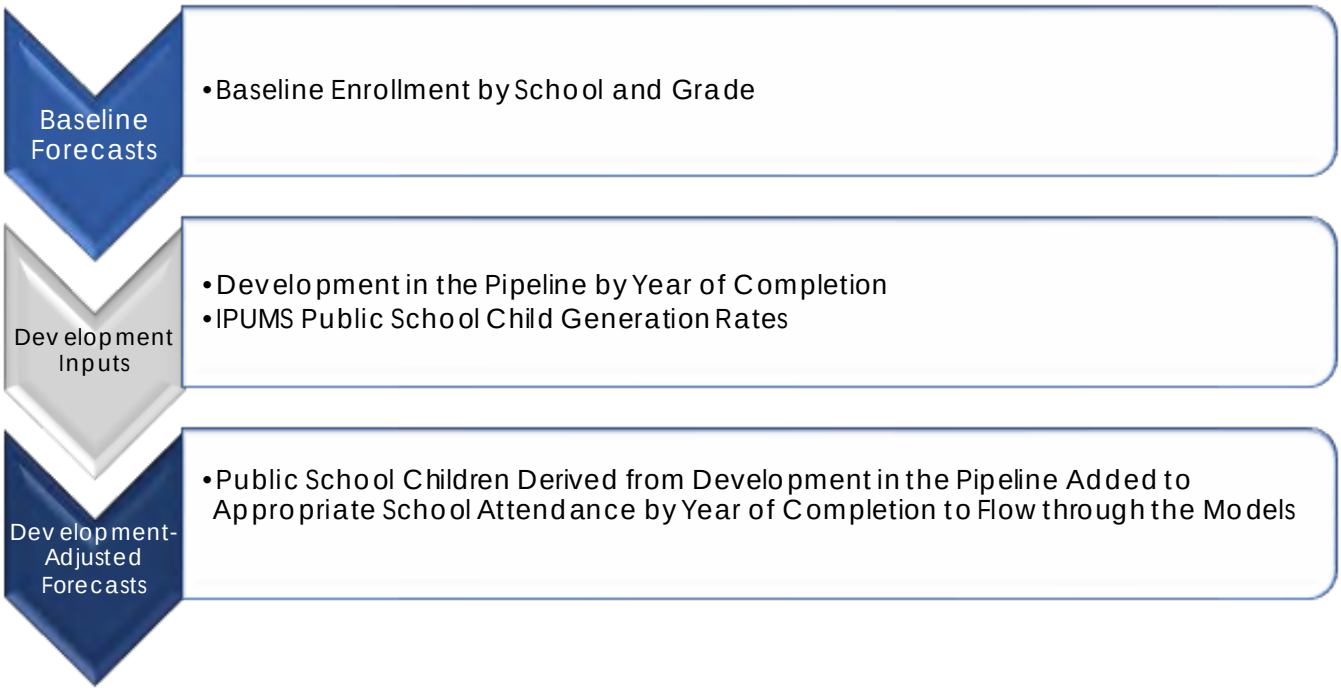

*Source: ESRI Business Analyst, 2023.*

Figure 13. Population Enrolled in Private School (Grades 9-12) by Block Group, 2021




- *Source: ESRI Business Analyst, 2023.*

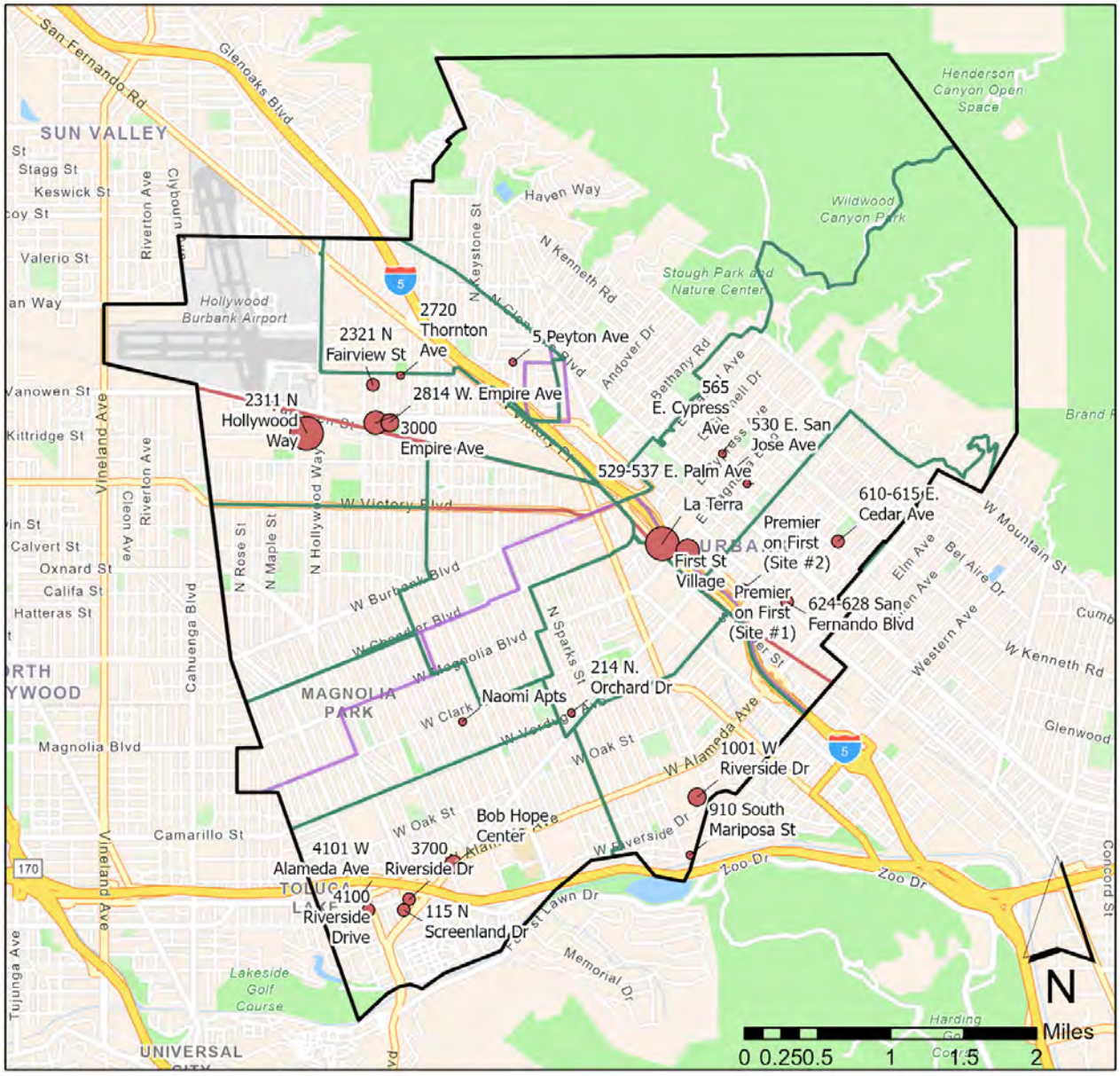
## Real Estate Development Modeling




## Real Estate Development in the Pipeline

The development of new housing will affect the Burbank USD by generating new public school children. In order to account for these additions, Urbanomics identified development in the pipeline, i.e., proposed, planned, approved, or under construction. There are currently some 2,906 units with or pending entitlements for construction in the next 5 years. There is also the potential for another 9,239 units under as-of-right development according to the 2022 City of Burbank Housing Element. The projects with entitlements are shown in Table 7 and mapped in Figure 14. The unit counts are then distributed to school attendance zones in Table 8.

Figure 14. Development in the Pipeline




## Housing Projects in the Pipeline, 2023

By Number of Units in the Pipeline

- 2 - 23
- 24 - 77
- 78 - 148
- 149 - 337
- 338 - 862

- Burbank USD Boundary
- Elementary School Attendance Boundaries
- Middle School Attendance Boundaries
- High School Attendance Boundaries

Urbanomics

*Sources: City of Burbank, Housing Element of the General Plan, 2022; Burbank USD, Attendance Boundaries, 2023.*

Table 7. Burbank Development in the Pipeline and Enrollment Zone Designations

| Name | St_Address | Units | Type | Tenure | Year Completed | Assumption | ES_Zone | MS_Zone | HS_Zone |
|---|---|---|---|---|---|---|---|---|---|
| La Terra | 777 Front Street Burbank | 573 | Low-Rise | Rentals | 2025 | As reported by Burbank | Emerson | Dolores Huer (Jordan) | BURBANK |
| 3700 Riverside Drive | 3700 Riverside Drive | 49 | Low-Rise | Condos | 2024 | 2 years after approval (post covid era) | Stevenson | Dolores Huer (Jordan) | BURROUGHS |
| Former Frys Electronic Site | 2311 N Hollywood Way | 862 | | | 2025 | As reported by Burbank | Providencia | Luter | OPTION |
| 610-615 E. Cedar Avenue | 601-615 E. Cedar Avenue | 32 | Low-Rise | | 2023 | 4 years after approval (COVID Lag) | Miller | MUIR | BURBANK |
| First Street Village | 315 N 1st St | 275 | Low-Rise | Rentals | 2025 | Estimated (3 phase project with first phase to be completed in 2023) | Emerson | MUIR | BURBANK |
| Naomi Apartments | Naomi St | 6 | | | 2024 | 4 years after approval (COVID Lag) | Roosevelt | Dolores Huer (Jordan) | BURROUGHS |
| 530 E. San Jose Ave | 530 E. San Jose Avenue | 2 | | | 2024 | 4 years after approval (COVID Lag) | Emerson | MUIR | BURBANK |
| 565 E. Cypress Avenue | 565 E Cypress Ave | 2 | | | 2024 | 4 years after approval (COVID Lag) | Emerson | MUIR | BURBANK |
| 214 N. Orchard Drive | 214 N. Orchard Drive | 2 | | | 2024 | 4 years after approval (COVID Lag) | Disney | Dolores Huer (Jordan) | BURROUGHS |
| Premier on First (Site 2) | 103 E. Verdugo | 77 | Low-Rise | Rentals | 2025 | 2 years after first phase | Miller | MUIR | BURBANK |
| Premier on First (Site #1) | 103 E. Verdugo | 77 | Low-Rise | Rentals | 2023 | As reported by Burbank | Miller | MUIR | BURBANK |
| 624-628 San Fernando Blvd | 624-628 S. San Fernando Boulevard | 42 | Low-Rise | Rentals | 2024 | 4 years after approval (COVID Lag) | Miller | MUIR | BURBANK |
| Bob Hope Center | 3201 W Olive Ave | 123 | Low-Rise | Rentals | 2027 | 4 years after proposed | Stevenson | Dolores Huer (Jordan) | BURROUGHS |
| 2720 Thornton Ave | 2720 Thornton Avenue | 2 | | | 2027 | First proposed in 2018, still active | Providencia | Luter | BURBANK |
| 529-537 E. Palm Av | 529-537 E. Palm Avenue | 19 | Low-Rise | Rentals | 2027 | 4 years after proposed | Emerson | MUIR | BURBANK |
| 2814 W. Empire Av | 2814 Empire Ave | 148 | Low-Rise | Rentals | 2027 | 4 years after proposed | Providencia | Luter | BURBANK |
| 3000 EMPIRE AVE | 3000 W. Empire Ave | 337 | Low-Rise | Rentals | 2025 | 4 years after proposed | Providencia | Luter | BURBANK |
| 4100 Riverside Drive | 4100 W Riverside Dr | 44 | Low-Rise | Rentals | 2026 | 4 years after proposed | Stevenson | Dolores Huer (Jordan) | BURROUGHS |
| 5 PEYTON AVE | 5 Peyton Ave | 3 | | | 2027 | 4 years after proposed | Washington | Luter | BURBANK |
| 910 S MARIPOSA ST | 910 South Mariposa Street | 23 | Townhomes | Condos | 2027 | 4 years after proposed | McKinley | Dolores Huer (Jordan) | BURROUGHS |
| 2321 N FAIRVIEW ST | 2321 N Fairview St | 60 | | | 2027 | 4 years after proposed | Providencia | Luter | BURBANK |
| 4101 W ALAMEDA AVE | 4101 W Alameda Ave | 12 | | | 2026 | 4 years after proposed | Stevenson | Dolores Huer (Jordan) | BURROUGHS |
| 1001 RIVERSIDE DR | 1001 W Riverside Dr | 96 | | | 2026 | 4 years after proposed | McKinley | Dolores Huer (Jordan) | BURROUGHS |
| 115 N SCREENLAND DR | 115 N Screenland Dr | 40 | High-Rise | Rentals | 2026 | 4 years after proposed | Stevenson | Dolores Huer (Jordan) | BURROUGHS |

Source: Adopted Burbank Housing Element 2021-2029, Moody's REIS

Table 8. Burbank Development by Year of Completion Attributed to Attendance Zones

| | Burbank High | Burroughs High | Muir Middle | Jordan Middle | Luther Middle | Miller | Emerson | Washington | Providencia | McKinley | Stevenson | Roosevelt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2023 | 38 | 0 | 38 | 0 | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2024 | 18 | 20 | 18 | 20 | 0 | 18 | 0 | 0 | 0 | 0 | 18 | 2 |
| 2025 | 886 | 0 | 140 | 212 | 534 | 26 | 326 | 0 | 534 | 0 | 0 | 0 |
| 2026 | 0 | 88 | 0 | 88 | 0 | 0 | 0 | 0 | 0 | 40 | 48 | 0 |
| 2027 | 114 | 58 | 8 | 58 | 106 | 0 | 8 | 2 | 104 | 14 | 44 | 0 |

## PUMS Multipliers/Testing

The child generation rate standard for developers are the State-Level Multipliers prepared in 2006 by Drs. Robert Burchell and David Listokin for the Rutgers Center for Urban Policy Research. These multipliers (Rutgers' multipliers) are an excellent body of work based on the 2000 US Census 5% Sample Public Use Microdata (PUMS); however, more than two decades have passed since the 2000 Census and significant changes have occurred in terms of development styles and housing preferences. Urbanomics prepared customized crosstabulations of public school children by household tenure, type, year built, and number of bedrooms from the US Census Bureau's Public Use Microdata Sample (PUMS) for the public use microdata areas (PUMA) that makes up the City of Burbank, Los Angeles County, and the San Fernando Valley. Year built data were limited to construction since 2000 in order to better reflect modern construction characteristics (e.g., generally smaller units with larger kitchens), which can differ dramatically from older construction (e.g., generally larger units with small kitchens).

The multipliers are shown in the figure below.

Homeowner School Child Multipliers

| | 1 Family | 2-4 Unit Multi-Family | 5+ Unit Multi-Family |
|---|---|---|---|
| Studios | 0.18 | - | - |
| 1-BD | - | - | 0.49 |
| 2 BD | 0.16 | - | 0.20 |
| 3+ BD | 0.49 | 1.37 | 0.42 |

Renter School Child Multipliers

| | 1 Family | 2-4 Unit Multi-Family | 5+ Unit Multi-Family |
|---|---|---|---|
| Studios | - | 1.00 | 0.07 |
| 1-BD | 0.20 | 0.25 | 0.13 |
| 2 BD | 0.67 | 0.54 | 0.29 |
| 3+ BD | 0.59 | 0.85 | 0.52 |

Grade Level Distribution

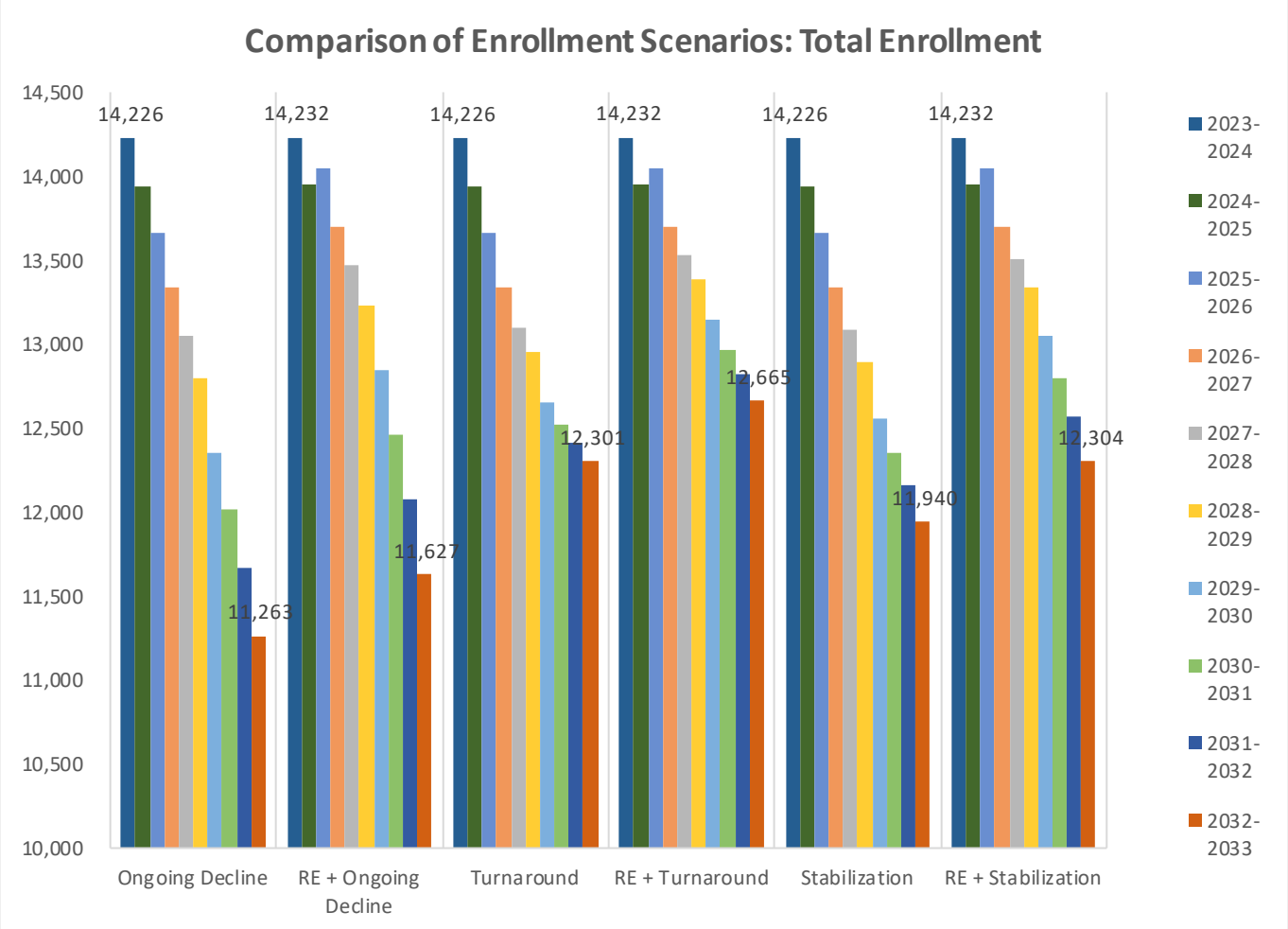
The estimated total number of students per new development need to be distributed by grade level for incorporation into the school-specific models. Once again, the distribution of actual students in existing units was used to determine the distribution of students by grade for the development in the pipeline and were incorporated into the forecasts.

# Enrollment Forecasts

## Cohort-Survival Enrollment Projections

### District Projections

Figure 15 shows six different baseline forecasts prepared at the District level. As shown, the forecasts in the terminal year of 2034-35 range from a low of 11,023 from the 5-year retention rate methodology with declining birth rates to 12,301 students from the 5-year retention rate with a 2 percent turnaround in birth rates. When the children derived from new development are added in (+RE), the District forecasts range from 11,627 to 12,665. Ultimately, the 5-Year Forecast with Stabilized Birth Rates was selected for use with the facilities study. The full results by school can be found in the appendix.



## District

| | 5-Year Stabilized Birth Rate + Real Estate Build Out | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 1,066 | 958 | 1,027 | 959 | 1,054 | 1,102 | 1,171 | 1,198 | 1,209 | 1,373 | 1,358 | 1,326 | 1,255 | 15,056 |
| 2014-2015 | - | 1,088 | 1,015 | 1,003 | 1,047 | 998 | 1,054 | 1,207 | 1,215 | 1,195 | 1,374 | 1,374 | 1,297 | 1,279 | 15,146 |
| 2015-2016 | 187 | 903 | 987 | 998 | 1,020 | 1,066 | 997 | 1,128 | 1,238 | 1,206 | 1,341 | 1,374 | 1,308 | 1,236 | 14,989 |
| 2016-2017 | 192 | 1,013 | 967 | 995 | 1,034 | 1,044 | 1,082 | 1,077 | 1,167 | 1,255 | 1,379 | 1,381 | 1,409 | 1,442 | 15,437 |
| 2017-2018 | 190 | 931 | 1,078 | 967 | 1,018 | 1,058 | 1,047 | 1,138 | 1,129 | 1,190 | 1,367 | 1,378 | 1,311 | 1,296 | 15,098 |
| 2018-2019 | 212 | 962 | 1,002 | 1,094 | 986 | 1,045 | 1,074 | 1,134 | 1,196 | 1,129 | 1,344 | 1,377 | 1,318 | 1,241 | 15,114 |
| 2019-2020 | 228 | 1,008 | 1,006 | 1,003 | 1,119 | 973 | 1,045 | 1,138 | 1,192 | 1,203 | 1,251 | 1,327 | 1,336 | 1,275 | 15,104 |
| 2020-2021 | 188 | 882 | 995 | 1,003 | 972 | 1,109 | 959 | 1,101 | 1,146 | 1,179 | 1,315 | 1,259 | 1,286 | 1,300 | 14,694 |
| 2021-2022 | 209 | 949 | 924 | 987 | 998 | 962 | 1,104 | 999 | 1,100 | 1,141 | 1,325 | 1,293 | 1,221 | 1,238 | 14,450 |
| 2022-2023 | 300 | 879 | 969 | 895 | 977 | 966 | 975 | 1,156 | 1,052 | 1,124 | 1,315 | 1,325 | 1,308 | 1,221 | 14,462 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 261 | 758 | 1,007 | 967 | 897 | 973 | 971 | 1,034 | 1,196 | 1,058 | 1,263 | 1,314 | 1,295 | 1,272 | 14,264 |
| 2024-2025 | 256 | 742 | 870 | 1,004 | 969 | 893 | 977 | 1,029 | 1,070 | 1,202 | 1,189 | 1,262 | 1,284 | 1,259 | 14,008 |
| 2025-2026 | 267 | 776 | 918 | 934 | 1,072 | 1,030 | 963 | 1,101 | 1,130 | 1,141 | 1,416 | 1,253 | 1,299 | 1,314 | 14,614 |
| 2026-2027 | 241 | 698 | 895 | 919 | 940 | 1,070 | 1,039 | 1,025 | 1,143 | 1,140 | 1,286 | 1,419 | 1,229 | 1,267 | 14,311 |
| 2027-2028 | 242 | 703 | 812 | 903 | 932 | 946 | 1,085 | 1,111 | 1,071 | 1,160 | 1,292 | 1,295 | 1,397 | 1,206 | 14,155 |
| 2028-2029 | 239 | 693 | 804 | 808 | 903 | 925 | 948 | 1,147 | 1,147 | 1,074 | 1,300 | 1,288 | 1,263 | 1,355 | 13,893 |
| 2029-2030 | 239 | 693 | 793 | 800 | 807 | 896 | 927 | 1,002 | 1,184 | 1,150 | 1,204 | 1,296 | 1,256 | 1,225 | 13,472 |
| 2030-2031 | 239 | 693 | 793 | 789 | 800 | 801 | 897 | 980 | 1,034 | 1,187 | 1,289 | 1,201 | 1,264 | 1,218 | 13,185 |
| 2031-2032 | 239 | 693 | 793 | 789 | 788 | 793 | 803 | 949 | 1,011 | 1,037 | 1,331 | 1,285 | 1,171 | 1,226 | 12,909 |
| 2032-2033 | 239 | 693 | 793 | 789 | 788 | 782 | 795 | 848 | 979 | 1,014 | 1,163 | 1,327 | 1,254 | 1,136 | 12,600 |

## Washington

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 59 | 62 | 91 | 60 | 91 | 90 | - | - | - | - | - | - | - | 453 |
| 2014-2015 | - | 82 | 58 | 62 | 93 | 64 | 86 | - | - | - | - | - | - | - | 445 |
| 2015-2016 | 22 | 69 | 71 | 56 | 68 | 87 | 60 | - | - | - | - | - | - | - | 433 |
| 2016-2017 | 47 | 80 | 74 | 74 | 62 | 74 | 89 | - | - | - | - | - | - | - | 500 |
| 2017-2018 | 46 | 77 | 90 | 75 | 73 | 59 | 72 | - | - | - | - | - | - | - | 492 |
| 2018-2019 | 48 | 69 | 76 | 88 | 73 | 70 | 60 | - | - | - | - | - | - | - | 484 |
| 2019-2020 | 47 | 72 | 70 | 75 | 97 | 63 | 67 | - | - | - | - | - | - | - | 491 |
| 2020-2021 | 45 | 56 | 68 | 72 | 71 | 90 | 61 | - | - | - | - | - | - | - | 463 |
| 2021-2022 | 40 | 74 | 59 | 62 | 67 | 59 | 83 | - | - | - | - | - | - | - | 444 |
| 2022-2023 | 48 | 65 | 72 | 59 | 65 | 62 | 63 | - | - | - | - | - | - | - | 434 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 25 | 73 | 68 | 71 | 59 | 59 | 61 | - | - | - | - | - | - | - | 416 |
| 2024-2025 | 25 | 72 | 59 | 67 | 71 | 53 | 58 | - | - | - | - | - | - | - | 404 |
| 2025-2026 | 24 | 70 | 58 | 58 | 67 | 64 | 52 | - | - | - | - | - | - | - | 393 |
| 2026-2027 | 23 | 67 | 57 | 57 | 58 | 60 | 63 | - | - | - | - | - | - | - | 385 |
| 2027-2028 | 23 | 67 | 54 | 56 | 57 | 52 | 59 | - | - | - | - | - | - | - | 370 |
| 2028-2029 | 23 | 67 | 54 | 53 | 56 | 51 | 52 | - | - | - | - | - | - | - | 357 |
| 2029-2030 | 23 | 67 | 54 | 53 | 53 | 50 | 51 | - | - | - | - | - | - | - | 352 |
| 2030-2031 | 23 | 67 | 54 | 53 | 53 | 48 | 50 | - | - | - | - | - | - | - | 349 |
| 2031-2032 | 23 | 67 | 54 | 53 | 53 | 48 | 47 | - | - | - | - | - | - | - | 347 |
| 2032-2033 | 23 | 67 | 54 | 53 | 53 | 48 | 47 | - | - | - | - | - | - | - | 347 |

## Stevenson

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 120 | 93 | 89 | 94 | 86 | 98 | - | - | - | - | - | - | - | 580 |
| 2014-2015 | - | 78 | 120 | 95 | 88 | 100 | 91 | - | - | - | - | - | - | - | 572 |
| 2015-2016 | - | 93 | 77 | 118 | 92 | 91 | 98 | - | - | - | - | - | - | - | 569 |
| 2016-2017 | - | 102 | 96 | 87 | 118 | 97 | 98 | - | - | - | - | - | - | - | 598 |
| 2017-2018 | - | 82 | 111 | 99 | 88 | 125 | 100 | - | - | - | - | - | - | - | 605 |
| 2018-2019 | 1 | 98 | 94 | 117 | 98 | 102 | 121 | - | - | - | - | - | - | - | 631 |
| 2019-2020 | 22 | 99 | 98 | 94 | 123 | 95 | 93 | - | - | - | - | - | - | - | 624 |
| 2020-2021 | 19 | 82 | 97 | 97 | 92 | 123 | 94 | - | - | - | - | - | - | - | 604 |
| 2021-2022 | 25 | 97 | 77 | 98 | 91 | 85 | 120 | - | - | - | - | - | - | - | 593 |
| 2022-2023 | 48 | 72 | 88 | 73 | 97 | 83 | 81 | - | - | - | - | - | - | - | 542 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 25 | 73 | 106 | 88 | 72 | 96 | 80 | - | - | - | - | - | - | - | 541 |
| 2024-2025 | 25 | 73 | 88 | 108 | 89 | 73 | 94 | - | - | - | - | - | - | - | 549 |
| 2025-2026 | 24 | 70 | 87 | 89 | 106 | 88 | 70 | - | - | - | - | - | - | - | 534 |
| 2026-2027 | 24 | 70 | 87 | 90 | 91 | 109 | 88 | - | - | - | - | - | - | - | 560 |
| 2027-2028 | 24 | 70 | 87 | 91 | 93 | 94 | 108 | - | - | - | - | - | - | - | 566 |
| 2028-2029 | 23 | 67 | 83 | 87 | 90 | 92 | 90 | - | - | - | - | - | - | - | 532 |
| 2029-2030 | 23 | 67 | 80 | 83 | 86 | 89 | 88 | - | - | - | - | - | - | - | 516 |
| 2030-2031 | 23 | 67 | 80 | 80 | 82 | 85 | 86 | - | - | - | - | - | - | - | 503 |
| 2031-2032 | 23 | 67 | 80 | 80 | 79 | 81 | 82 | - | - | - | - | - | - | - | 492 |
| 2032-2033 | 23 | 67 | 80 | 80 | 79 | 79 | 78 | - | - | - | - | - | - | - | 486 |

## Roosevelt

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 99 | 106 | 112 | 92 | 98 | 128 | - | - | - | - | - | - | - | 635 |
| 2014-2015 | - | 104 | 98 | 105 | 116 | 94 | 93 | - | - | - | - | - | - | - | 610 |
| 2015-2016 | 25 | 87 | 113 | 95 | 108 | 118 | 95 | - | - | - | - | - | - | - | 641 |
| 2016-2017 | 25 | 99 | 95 | 117 | 99 | 102 | 118 | - | - | - | - | - | - | - | 655 |
| 2017-2018 | 24 | 97 | 95 | 96 | 118 | 106 | 111 | - | - | - | - | - | - | - | 647 |
| 2018-2019 | 24 | 90 | 99 | 97 | 96 | 119 | 107 | - | - | - | - | - | - | - | 632 |
| 2019-2020 | 23 | 95 | 95 | 98 | 95 | 96 | 125 | - | - | - | - | - | - | - | 627 |
| 2020-2021 | 19 | 94 | 95 | 94 | 100 | 99 | 94 | - | - | - | - | - | - | - | 595 |
| 2021-2022 | 25 | 89 | 90 | 93 | 85 | 96 | 90 | - | - | - | - | - | - | - | 568 |
| 2022-2023 | 24 | 95 | 93 | 93 | 90 | 87 | 95 | - | - | - | - | - | - | - | 577 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 26 | 75 | 97 | 93 | 91 | 91 | 86 | - | - | - | - | - | - | - | 558 |
| 2024-2025 | 25 | 74 | 82 | 97 | 91 | 91 | 90 | - | - | - | - | - | - | - | 551 |
| 2025-2026 | 25 | 72 | 81 | 83 | 95 | 92 | 90 | - | - | - | - | - | - | - | 537 |
| 2026-2027 | 24 | 69 | 79 | 81 | 80 | 95 | 90 | - | - | - | - | - | - | - | 519 |
| 2027-2028 | 24 | 69 | 75 | 79 | 79 | 81 | 94 | - | - | - | - | - | - | - | 501 |
| 2028-2029 | 24 | 69 | 75 | 76 | 77 | 79 | 80 | - | - | - | - | - | - | - | 480 |
| 2029-2030 | 24 | 69 | 75 | 76 | 74 | 78 | 78 | - | - | - | - | - | - | - | 473 |
| 2030-2031 | 24 | 69 | 75 | 76 | 74 | 74 | 77 | - | - | - | - | - | - | - | 468 |
| 2031-2032 | 24 | 69 | 75 | 76 | 74 | 74 | 73 | - | - | - | - | - | - | - | 464 |
| 2032-2033 | 24 | 69 | 75 | 76 | 74 | 74 | 73 | - | - | - | - | - | - | - | 464 |

## Providencia

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 58 | 58 | 57 | 75 | 63 | 77 | - | - | - | - | - | - | - | 388 |
| 2014-2015 | - | 52 | 55 | 62 | 61 | 81 | 65 | - | - | - | - | - | - | - | 376 |
| 2015-2016 | - | 51 | 64 | 62 | 71 | 65 | 79 | - | - | - | - | - | - | - | 392 |
| 2016-2017 | - | 63 | 58 | 64 | 69 | 68 | 65 | - | - | - | - | - | - | - | 387 |
| 2017-2018 | 25 | 45 | 64 | 57 | 72 | 71 | 62 | - | - | - | - | - | - | - | 396 |
| 2018-2019 | 24 | 70 | 48 | 63 | 59 | 65 | 78 | - | - | - | - | - | - | - | 407 |
| 2019-2020 | 25 | 71 | 70 | 49 | 68 | 62 | 68 | - | - | - | - | - | - | - | 413 |
| 2020-2021 | 22 | 60 | 76 | 70 | 48 | 61 | 62 | - | - | - | - | - | - | - | 399 |
| 2021-2022 | 25 | 69 | 68 | 72 | 68 | 53 | 62 | - | - | - | - | - | - | - | 417 |
| 2022-2023 | 23 | 68 | 70 | 65 | 70 | 58 | 58 | - | - | - | - | - | - | - | 412 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 20 | 59 | 69 | 69 | 65 | 67 | 61 | - | - | - | - | - | - | - | 411 |
| 2024-2025 | 20 | 58 | 61 | 68 | 69 | 63 | 71 | - | - | - | - | - | - | - | 410 |
| 2025-2026 | 30 | 88 | 100 | 101 | 109 | 108 | 107 | - | - | - | - | - | - | - | 643 |
| 2026-2027 | 19 | 54 | 89 | 99 | 101 | 105 | 113 | - | - | - | - | - | - | - | 581 |
| 2027-2028 | 21 | 60 | 64 | 96 | 107 | 105 | 119 | - | - | - | - | - | - | - | 572 |
| 2028-2029 | 19 | 54 | 62 | 62 | 96 | 103 | 111 | - | - | - | - | - | - | - | 508 |
| 2029-2030 | 19 | 54 | 56 | 61 | 63 | 93 | 108 | - | - | - | - | - | - | - | 453 |
| 2030-2031 | 19 | 54 | 56 | 55 | 61 | 60 | 97 | - | - | - | - | - | - | - | 402 |
| 2031-2032 | 19 | 54 | 56 | 55 | 55 | 59 | 64 | - | - | - | - | - | - | - | 361 |
| 2032-2033 | 19 | 54 | 56 | 55 | 55 | 53 | 62 | - | - | - | - | - | - | - | 353 |

## McKinley

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 86 | 60 | 69 | 62 | 69 | 70 | - | - | - | - | - | - | - | 416 |
| 2014-2015 | - | 79 | 85 | 63 | 71 | 61 | 70 | - | - | - | - | - | - | - | 429 |
| 2015-2016 | 25 | 81 | 83 | 74 | 66 | 73 | 60 | - | - | - | - | - | - | - | 462 |
| 2016-2017 | 24 | 85 | 77 | 73 | 76 | 63 | 67 | - | - | - | - | - | - | - | 465 |
| 2017-2018 | 23 | 83 | 81 | 74 | 80 | 76 | 64 | - | - | - | - | - | - | - | 481 |
| 2018-2019 | 22 | 70 | 88 | 82 | 74 | 83 | 73 | - | - | - | - | - | - | - | 492 |
| 2019-2020 | 22 | 70 | 73 | 84 | 81 | 77 | 82 | - | - | - | - | - | - | - | 489 |
| 2020-2021 | 16 | 67 | 71 | 74 | 80 | 79 | 79 | - | - | - | - | - | - | - | 466 |
| 2021-2022 | 19 | 61 | 61 | 67 | 69 | 81 | 80 | - | - | - | - | - | - | - | 438 |
| 2022-2023 | 24 | 68 | 70 | 65 | 69 | 74 | 82 | - | - | - | - | - | - | - | 452 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 20 | 57 | 74 | 70 | 64 | 71 | 74 | - | - | - | - | - | - | - | 429 |
| 2024-2025 | 19 | 56 | 61 | 74 | 68 | 65 | 71 | - | - | - | - | - | - | - | 415 |
| 2025-2026 | 19 | 55 | 60 | 61 | 72 | 70 | 65 | - | - | - | - | - | - | - | 403 |
| 2026-2027 | 19 | 55 | 62 | 63 | 63 | 77 | 73 | - | - | - | - | - | - | - | 412 |
| 2027-2028 | 18 | 53 | 60 | 63 | 63 | 66 | 78 | - | - | - | - | - | - | - | 401 |
| 2028-2029 | 18 | 52 | 57 | 60 | 62 | 65 | 66 | - | - | - | - | - | - | - | 380 |
| 2029-2030 | 18 | 52 | 56 | 57 | 59 | 63 | 65 | - | - | - | - | - | - | - | 370 |
| 2030-2031 | 18 | 52 | 56 | 56 | 56 | 60 | 63 | - | - | - | - | - | - | - | 362 |
| 2031-2032 | 18 | 52 | 56 | 56 | 55 | 58 | 60 | - | - | - | - | - | - | - | 356 |
| 2032-2033 | 18 | 52 | 56 | 56 | 55 | 57 | 57 | - | - | - | - | - | - | - | 352 |

## Disney

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 86 | 52 | 61 | 61 | 67 | 65 | - | - | - | - | - | - | - | 392 |
| 2014-2015 | - | 76 | 81 | 56 | 60 | 54 | 66 | - | - | - | - | - | - | - | 393 |
| 2015-2016 | - | 56 | 71 | 71 | 54 | 62 | 53 | - | - | - | - | - | - | - | 367 |
| 2016-2017 | - | 73 | 63 | 67 | 72 | 58 | 64 | - | - | - | - | - | - | - | 397 |
| 2017-2018 | - | 69 | 72 | 64 | 72 | 80 | 60 | - | - | - | - | - | - | - | 417 |
| 2018-2019 | - | 64 | 72 | 72 | 71 | 76 | 86 | - | - | - | - | - | - | - | 441 |
| 2019-2020 | - | 71 | 68 | 74 | 73 | 73 | 76 | - | - | - | - | - | - | - | 435 |
| 2020-2021 | - | 62 | 71 | 69 | 70 | 72 | 70 | - | - | - | - | - | - | - | 414 |
| 2021-2022 | - | 59 | 62 | 56 | 69 | 62 | 71 | - | - | - | - | - | - | - | 379 |
| 2022-2023 | - | 64 | 70 | 59 | 64 | 67 | 63 | - | - | - | - | - | - | - | 387 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 14 | 42 | 68 | 67 | 62 | 63 | 67 | - | - | - | - | - | - | - | 383 |
| 2024-2025 | 14 | 41 | 59 | 65 | 70 | 61 | 64 | - | - | - | - | - | - | - | 372 |
| 2025-2026 | 14 | 40 | 58 | 57 | 68 | 69 | 61 | - | - | - | - | - | - | - | 365 |
| 2026-2027 | 13 | 38 | 57 | 55 | 59 | 67 | 69 | - | - | - | - | - | - | - | 358 |
| 2027-2028 | 13 | 38 | 54 | 54 | 58 | 58 | 67 | - | - | - | - | - | - | - | 342 |
| 2028-2029 | 13 | 38 | 54 | 52 | 57 | 57 | 58 | - | - | - | - | - | - | - | 329 |
| 2029-2030 | 13 | 38 | 54 | 52 | 54 | 56 | 57 | - | - | - | - | - | - | - | 324 |
| 2030-2031 | 13 | 38 | 54 | 52 | 54 | 53 | 56 | - | - | - | - | - | - | - | 321 |
| 2031-2032 | 13 | 38 | 54 | 52 | 54 | 53 | 54 | - | - | - | - | - | - | - | 318 |
| 2032-2033 | 13 | 38 | 54 | 52 | 54 | 53 | 54 | - | - | - | - | - | - | - | 318 |

## Edison

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 87 | 91 | 90 | 92 | 97 | 90 | - | - | - | - | - | - | - | 547 |
| 2014-2015 | - | 80 | 84 | 90 | 89 | 88 | 90 | - | - | - | - | - | - | - | 521 |
| 2015-2016 | 43 | 72 | 88 | 91 | 82 | 89 | 86 | - | - | - | - | - | - | - | 551 |
| 2016-2017 | 48 | 76 | 73 | 85 | 89 | 88 | 90 | - | - | - | - | - | - | - | 549 |
| 2017-2018 | 47 | 88 | 93 | 70 | 84 | 91 | 87 | - | - | - | - | - | - | - | 560 |
| 2018-2019 | 24 | 95 | 91 | 98 | 74 | 86 | 92 | - | - | - | - | - | - | - | 560 |
| 2019-2020 | 22 | 95 | 97 | 93 | 98 | 69 | 88 | - | - | - | - | - | - | - | 562 |
| 2020-2021 | 23 | 87 | 87 | 94 | 86 | 90 | 64 | - | - | - | - | - | - | - | 531 |
| 2021-2022 | 22 | 67 | 76 | 85 | 89 | 81 | 90 | - | - | - | - | - | - | - | 510 |
| 2022-2023 | 24 | 72 | 61 | 70 | 80 | 78 | 79 | - | - | - | - | - | - | - | 464 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 24 | 69 | 69 | 60 | 68 | 75 | 77 | - | - | - | - | - | - | - | 442 |
| 2024-2025 | 23 | 67 | 67 | 69 | 59 | 64 | 74 | - | - | - | - | - | - | - | 423 |
| 2025-2026 | 23 | 66 | 65 | 66 | 67 | 55 | 63 | - | - | - | - | - | - | - | 405 |
| 2026-2027 | 22 | 63 | 64 | 65 | 64 | 63 | 54 | - | - | - | - | - | - | - | 395 |
| 2027-2028 | 22 | 63 | 61 | 63 | 63 | 60 | 62 | - | - | - | - | - | - | - | 394 |
| 2028-2029 | 22 | 63 | 61 | 60 | 62 | 59 | 60 | - | - | - | - | - | - | - | 387 |
| 2029-2030 | 22 | 63 | 61 | 60 | 59 | 58 | 58 | - | - | - | - | - | - | - | 381 |
| 2030-2031 | 22 | 63 | 61 | 60 | 59 | 55 | 57 | - | - | - | - | - | - | - | 378 |
| 2031-2032 | 22 | 63 | 61 | 60 | 59 | 55 | 55 | - | - | - | - | - | - | - | 375 |
| 2032-2033 | 22 | 63 | 61 | 60 | 59 | 55 | 55 | - | - | - | - | - | - | - | 375 |

## Jefferson

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 84 | 103 | 126 | 122 | 133 | 132 | - | - | - | - | - | - | - | 700 |
| 2014-2015 | - | 106 | 111 | 117 | 126 | 131 | 132 | - | - | - | - | - | - | - | 723 |
| 2015-2016 | 49 | 105 | 121 | 110 | 124 | 130 | 131 | - | - | - | - | - | - | - | 770 |
| 2016-2017 | 24 | 125 | 117 | 125 | 118 | 127 | 131 | - | - | - | - | - | - | - | 767 |
| 2017-2018 | - | 113 | 147 | 119 | 126 | 125 | 125 | - | - | - | - | - | - | - | 755 |
| 2018-2019 | - | 113 | 125 | 142 | 122 | 133 | 127 | - | - | - | - | - | - | - | 762 |
| 2019-2020 | - | 120 | 119 | 121 | 144 | 119 | 131 | - | - | - | - | - | - | - | 754 |
| 2020-2021 | - | 100 | 123 | 119 | 120 | 150 | 119 | - | - | - | - | - | - | - | 731 |
| 2021-2022 | - | 120 | 111 | 120 | 120 | 119 | 148 | - | - | - | - | - | - | - | 738 |
| 2022-2023 | 24 | 114 | 122 | 119 | 123 | 130 | 126 | - | - | - | - | - | - | - | 758 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 27 | 77 | 147 | 122 | 121 | 127 | 131 | - | - | - | - | - | - | - | 750 |
| 2024-2025 | 26 | 75 | 110 | 146 | 123 | 124 | 128 | - | - | - | - | - | - | - | 732 |
| 2025-2026 | 25 | 74 | 108 | 110 | 148 | 127 | 125 | - | - | - | - | - | - | - | 717 |
| 2026-2027 | 24 | 71 | 106 | 107 | 111 | 152 | 128 | - | - | - | - | - | - | - | 699 |
| 2027-2028 | 24 | 71 | 101 | 105 | 109 | 114 | 154 | - | - | - | - | - | - | - | 678 |
| 2028-2029 | 24 | 71 | 101 | 101 | 107 | 112 | 115 | - | - | - | - | - | - | - | 630 |
| 2029-2030 | 24 | 71 | 101 | 101 | 102 | 110 | 113 | - | - | - | - | - | - | - | 621 |
| 2030-2031 | 24 | 71 | 101 | 101 | 102 | 105 | 111 | - | - | - | - | - | - | - | 614 |
| 2031-2032 | 24 | 71 | 101 | 101 | 102 | 105 | 106 | - | - | - | - | - | - | - | 609 |
| 2032-2033 | 24 | 71 | 101 | 101 | 102 | 105 | 106 | - | - | - | - | - | - | - | 609 |

## Harte

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 88 | 110 | 111 | 93 | 125 | 108 | - | - | - | - | - | - | - | 635 |
| 2014-2015 | - | 81 | 107 | 120 | 121 | 95 | 127 | - | - | - | - | - | - | - | 651 |
| 2015-2016 | - | 92 | 82 | 106 | 119 | 117 | 98 | - | - | - | - | - | - | - | 614 |
| 2016-2017 | - | 95 | 97 | 80 | 109 | 120 | 123 | - | - | - | - | - | - | - | 624 |
| 2017-2018 | - | 88 | 93 | 87 | 83 | 102 | 122 | - | - | - | - | - | - | - | 575 |
| 2018-2019 | 24 | 91 | 95 | 94 | 95 | 80 | 100 | - | - | - | - | - | - | - | 579 |
| 2019-2020 | 26 | 98 | 93 | 95 | 96 | 98 | 85 | - | - | - | - | - | - | - | 591 |
| 2020-2021 | - | 86 | 95 | 97 | 91 | 95 | 92 | - | - | - | - | - | - | - | 556 |
| 2021-2022 | 2 | 83 | 87 | 86 | 91 | 92 | 88 | - | - | - | - | - | - | - | 529 |
| 2022-2023 | 22 | 74 | 94 | 88 | 89 | 95 | 97 | - | - | - | - | - | - | - | 559 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 23 | 66 | 92 | 93 | 89 | 90 | 94 | - | - | - | - | - | - | - | 546 |
| 2024-2025 | 22 | 64 | 84 | 91 | 94 | 89 | 89 | - | - | - | - | - | - | - | 534 |
| 2025-2026 | 22 | 63 | 82 | 84 | 92 | 95 | 89 | - | - | - | - | - | - | - | 526 |
| 2026-2027 | 21 | 60 | 81 | 82 | 84 | 93 | 94 | - | - | - | - | - | - | - | 515 |
| 2027-2028 | 21 | 60 | 77 | 80 | 83 | 85 | 92 | - | - | - | - | - | - | - | 498 |
| 2028-2029 | 21 | 60 | 77 | 77 | 81 | 83 | 84 | - | - | - | - | - | - | - | 483 |
| 2029-2030 | 21 | 60 | 77 | 77 | 77 | 82 | 83 | - | - | - | - | - | - | - | 476 |
| 2030-2031 | 21 | 60 | 77 | 77 | 77 | 78 | 81 | - | - | - | - | - | - | - | 471 |
| 2031-2032 | 21 | 60 | 77 | 77 | 77 | 78 | 77 | - | - | - | - | - | - | - | 467 |
| 2032-2033 | 21 | 60 | 77 | 77 | 77 | 78 | 77 | - | - | - | - | - | - | - | 467 |

## Emerson

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 84 | 116 | 96 | 105 | 101 | 101 | - | - | - | - | - | - | - | 603 |
| 2014-2015 | - | 81 | 101 | 118 | 96 | 102 | 98 | - | - | - | - | - | - | - | 596 |
| 2015-2016 | - | 93 | 96 | 96 | 118 | 100 | 100 | - | - | - | - | - | - | - | 603 |
| 2016-2017 | - | 95 | 98 | 97 | 93 | 114 | 99 | - | - | - | - | - | - | - | 596 |
| 2017-2018 | - | 88 | 112 | 102 | 96 | 95 | 113 | - | - | - | - | - | - | - | 606 |
| 2018-2019 | 22 | 85 | 100 | 120 | 99 | 99 | 97 | - | - | - | - | - | - | - | 622 |
| 2019-2020 | 21 | 98 | 98 | 98 | 119 | 98 | 96 | - | - | - | - | - | - | - | 628 |
| 2020-2021 | 23 | 80 | 93 | 99 | 88 | 121 | 97 | - | - | - | - | - | - | - | 601 |
| 2021-2022 | 22 | 80 | 82 | 95 | 96 | 92 | 122 | - | - | - | - | - | - | - | 589 |
| 2022-2023 | 23 | 72 | 95 | 83 | 98 | 96 | 99 | - | - | - | - | - | - | - | 566 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 23 | 68 | 87 | 97 | 81 | 100 | 97 | - | - | - | - | - | - | - | 553 |
| 2024-2025 | 23 | 67 | 84 | 88 | 94 | 82 | 101 | - | - | - | - | - | - | - | 539 |
| 2025-2026 | 29 | 84 | 107 | 110 | 111 | 121 | 108 | - | - | - | - | - | - | - | 670 |
| 2026-2027 | 22 | 62 | 103 | 109 | 107 | 113 | 122 | - | - | - | - | - | - | - | 638 |
| 2027-2028 | 22 | 63 | 77 | 106 | 107 | 110 | 115 | - | - | - | - | - | - | - | 599 |
| 2028-2029 | 22 | 62 | 77 | 79 | 103 | 108 | 111 | - | - | - | - | - | - | - | 562 |
| 2029-2030 | 22 | 62 | 77 | 79 | 77 | 104 | 110 | - | - | - | - | - | - | - | 530 |
| 2030-2031 | 22 | 62 | 77 | 78 | 77 | 78 | 106 | - | - | - | - | - | - | - | 499 |
| 2031-2032 | 22 | 62 | 77 | 78 | 76 | 78 | 79 | - | - | - | - | - | - | - | 471 |
| 2032-2033 | 22 | 62 | 77 | 78 | 76 | 77 | 79 | - | - | - | - | - | - | - | 471 |

## Miller

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | 98 | 106 | 123 | 102 | 121 | 136 | - | - | - | - | - | - | - | 686 |
| 2014-2015 | - | 103 | 113 | 113 | 124 | 127 | 132 | - | - | - | - | - | - | - | 712 |
| 2015-2016 | 23 | 104 | 120 | 117 | 117 | 131 | 136 | - | - | - | - | - | - | - | 748 |
| 2016-2017 | 24 | 119 | 119 | 122 | 127 | 130 | 134 | - | - | - | - | - | - | - | 775 |
| 2017-2018 | 25 | 101 | 120 | 124 | 123 | 125 | 129 | - | - | - | - | - | - | - | 747 |
| 2018-2019 | 23 | 115 | 114 | 119 | 125 | 130 | 128 | - | - | - | - | - | - | - | 754 |
| 2019-2020 | 20 | 119 | 123 | 120 | 123 | 123 | 131 | - | - | - | - | - | - | - | 759 |
| 2020-2021 | 21 | 106 | 119 | 117 | 123 | 125 | 125 | - | - | - | - | - | - | - | 736 |
| 2021-2022 | 25 | 118 | 121 | 122 | 117 | 122 | 121 | - | - | - | - | - | - | - | 746 |
| 2022-2023 | 39 | 110 | 125 | 118 | 121 | 129 | 127 | - | - | - | - | - | - | - | 769 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | 32 | 93 | 136 | 128 | 122 | 128 | 133 | - | - | - | - | - | - | - | 772 |
| 2024-2025 | 31 | 90 | 113 | 138 | 131 | 127 | 130 | - | - | - | - | - | - | - | 760 |
| 2025-2026 | 30 | 88 | 110 | 115 | 141 | 137 | 131 | - | - | - | - | - | - | - | 753 |
| 2026-2027 | 29 | 83 | 106 | 110 | 116 | 146 | 138 | - | - | - | - | - | - | - | 728 |
| 2027-2028 | 29 | 83 | 100 | 106 | 111 | 120 | 147 | - | - | - | - | - | - | - | 696 |
| 2028-2029 | 29 | 83 | 100 | 100 | 108 | 115 | 121 | - | - | - | - | - | - | - | 655 |
| 2029-2030 | 29 | 83 | 100 | 100 | 101 | 111 | 116 | - | - | - | - | - | - | - | 640 |
| 2030-2031 | 29 | 83 | 100 | 100 | 101 | 104 | 112 | - | - | - | - | - | - | - | 629 |
| 2031-2032 | 29 | 83 | 100 | 100 | 101 | 104 | 105 | - | - | - | - | - | - | - | 622 |
| 2032-2033 | 29 | 83 | 100 | 100 | 101 | 104 | 105 | - | - | - | - | - | - | - | 622 |

Luther

Sixth Grade retention based on 5th grade enrollment of Bret Harte, Providencia, Washington, and 1/2 of Edison elementary schools' 5th grade enrollment.

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | - | - | - | - | - | - | 362 | 367 | 366 | - | - | - | - | 1,095 |
| 2014-2015 | - | - | - | - | - | - | - | 371 | 372 | 359 | - | - | - | - | 1,102 |
| 2015-2016 | - | - | - | - | - | - | - | 333 | 361 | 364 | - | - | - | - | 1,058 |
| 2016-2017 | - | - | - | - | - | - | - | 306 | 341 | 360 | - | - | - | - | 1,007 |
| 2017-2018 | - | - | - | - | - | - | - | 308 | 312 | 350 | - | - | - | - | 970 |
| 2018-2019 | - | - | - | - | - | - | - | 311 | 320 | 318 | - | - | - | - | 949 |
| 2019-2020 | - | - | - | - | - | - | - | 311 | 320 | 314 | - | - | - | - | 945 |
| 2020-2021 | - | - | - | - | - | - | - | 292 | 298 | 312 | - | - | - | - | 902 |
| 2021-2022 | - | - | - | - | - | - | - | 260 | 291 | 304 | - | - | - | - | 855 |
| 2022-2023 | - | - | - | - | - | - | - | 313 | 257 | 279 | - | - | - | - | 849 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | - | - | - | - | - | - | - | 279 | 314 | 255 | - | - | - | - | 847 |
| 2024-2025 | - | - | - | - | - | - | - | 276 | 280 | 311 | - | - | - | - | 867 |
| 2025-2026 | - | - | - | - | - | - | - | 276 | 318 | 318 | - | - | - | - | 912 |
| 2026-2027 | - | - | - | - | - | - | - | 304 | 277 | 315 | - | - | - | - | 895 |
| 2027-2028 | - | - | - | - | - | - | - | 322 | 312 | 282 | - | - | - | - | 917 |
| 2028-2029 | - | - | - | - | - | - | - | 326 | 323 | 310 | - | - | - | - | 959 |
| 2029-2030 | - | - | - | - | - | - | - | 300 | 327 | 320 | - | - | - | - | 947 |
| 2030-2031 | - | - | - | - | - | - | - | 294 | 301 | 324 | - | - | - | - | 918 |
| 2031-2032 | - | - | - | - | - | - | - | 278 | 294 | 298 | - | - | - | - | 870 |
| 2032-2033 | - | - | - | - | - | - | - | 234 | 279 | 292 | - | - | - | - | 804 |

Jordan/Huerta

Sixth Grade retention based on 5th grade enrollment of Disney, McKinley, Roosevelt, Stevenson, and 1/2 of Edison elementary school 5th grade enrollment.

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | - | - | - | - | - | - | 318 | 399 | 394 | - | - | - | - | 1,111 |
| 2014-2015 | - | - | - | - | - | - | - | 364 | 323 | 393 | - | - | - | - | 1,080 |
| 2015-2016 | - | - | - | - | - | - | - | 342 | 375 | 312 | - | - | - | - | 1,029 |
| 2016-2017 | - | - | - | - | - | - | - | 334 | 352 | 379 | - | - | - | - | 1,065 |
| 2017-2018 | - | - | - | - | - | - | - | 368 | 339 | 355 | - | - | - | - | 1,062 |
| 2018-2019 | - | - | - | - | - | - | - | 350 | 377 | 330 | - | - | - | - | 1,057 |
| 2019-2020 | - | - | - | - | - | - | - | 380 | 351 | 377 | - | - | - | - | 1,108 |
| 2020-2021 | - | - | - | - | - | - | - | 350 | 379 | 335 | - | - | - | - | 1,064 |
| 2021-2022 | - | - | - | - | - | - | - | 284 | 328 | 352 | - | - | - | - | 964 |
| 2022-2023 | - | - | - | - | - | - | - | 324 | 287 | 339 | - | - | - | - | 950 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | - | - | - | - | - | - | - | 303 | 322 | 281 | - | - | - | - | 906 |
| 2024-2025 | - | - | - | - | - | - | - | 290 | 303 | 317 | - | - | - | - | 910 |
| 2025-2026 | - | - | - | - | - | - | - | 298 | 305 | 313 | - | - | - | - | 916 |
| 2026-2027 | - | - | - | - | - | - | - | 268 | 303 | 305 | - | - | - | - | 877 |
| 2027-2028 | - | - | - | - | - | - | - | 293 | 271 | 301 | - | - | - | - | 865 |
| 2028-2029 | - | - | - | - | - | - | - | 318 | 291 | 265 | - | - | - | - | 875 |
| 2029-2030 | - | - | - | - | - | - | - | 273 | 317 | 285 | - | - | - | - | 874 |
| 2030-2031 | - | - | - | - | - | - | - | 267 | 271 | 310 | - | - | - | - | 848 |
| 2031-2032 | - | - | - | - | - | - | - | 261 | 266 | 265 | - | - | - | - | 792 |
| 2032-2033 | - | - | - | - | - | - | - | 249 | 259 | 260 | - | - | - | - | 768 |

## Muir

Sixth Grade retention based on 5th grade enrollment of Miller, Emerson, and Jefferson elementary schools.

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | - | - | - | - | - | - | 485 | 426 | 438 | - | - | - | - | 1,349 |
| 2014-2015 | - | - | - | - | - | - | - | 465 | 511 | 432 | - | - | - | - | 1,408 |
| 2015-2016 | - | - | - | - | - | - | - | 447 | 494 | 518 | - | - | - | - | 1,459 |
| 2016-2017 | - | - | - | - | - | - | - | 435 | 464 | 503 | - | - | - | - | 1,402 |
| 2017-2018 | - | - | - | - | - | - | - | 455 | 474 | 474 | - | - | - | - | 1,403 |
| 2018-2019 | - | - | - | - | - | - | - | 472 | 483 | 476 | - | - | - | - | 1,431 |
| 2019-2020 | - | - | - | - | - | - | - | 442 | 514 | 497 | - | - | - | - | 1,453 |
| 2020-2021 | - | - | - | - | - | - | - | 455 | 459 | 507 | - | - | - | - | 1,421 |
| 2021-2022 | - | - | - | - | - | - | - | 442 | 469 | 458 | - | - | - | - | 1,369 |
| 2022-2023 | - | - | - | - | - | - | - | 508 | 496 | 488 | - | - | - | - | 1,492 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | - | - | - | - | - | - | - | 454 | 546 | 505 | - | - | - | - | 1,504 |
| 2024-2025 | - | - | - | - | - | - | - | 464 | 486 | 553 | - | - | - | - | 1,504 |
| 2025-2026 | - | - | - | - | - | - | - | 460 | 506 | 503 | - | - | - | - | 1,469 |
| 2026-2027 | - | - | - | - | - | - | - | 467 | 492 | 512 | - | - | - | - | 1,471 |
| 2027-2028 | - | - | - | - | - | - | - | 498 | 499 | 497 | - | - | - | - | 1,494 |
| 2028-2029 | - | - | - | - | - | - | - | 533 | 532 | 505 | - | - | - | - | 1,569 |
| 2029-2030 | - | - | - | - | - | - | - | 446 | 569 | 538 | - | - | - | - | 1,553 |
| 2030-2031 | - | - | - | - | - | - | - | 434 | 476 | 576 | - | - | - | - | 1,486 |
| 2031-2032 | - | - | - | - | - | - | - | 421 | 464 | 481 | - | - | - | - | 1,366 |
| 2032-2033 | - | - | - | - | - | - | - | 372 | 450 | 469 | - | - | - | - | 1,291 |

Burroughs

Ninth Grade retention based on 8th grade enrollment of Huerta/Jordan and 1/2 of 8th grade enrollment at Luther Middle schools.

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | - | - | - | - | - | - | - | - | - | 680 | 710 | 629 | 608 | 2,627 |
| 2014-2015 | - | - | - | - | - | - | - | - | - | - | 716 | 664 | 663 | 610 | 2,653 |
| 2015-2016 | - | - | - | - | - | - | - | - | - | - | 705 | 691 | 605 | 619 | 2,620 |
| 2016-2017 | - | - | - | - | - | - | - | - | - | - | 659 | 703 | 673 | 577 | 2,612 |
| 2017-2018 | - | - | - | - | - | - | - | - | - | - | 683 | 650 | 642 | 646 | 2,621 |
| 2018-2019 | - | - | - | - | - | - | - | - | - | - | 688 | 672 | 609 | 602 | 2,571 |
| 2019-2020 | - | - | - | - | - | - | - | - | - | - | 622 | 671 | 635 | 575 | 2,503 |
| 2020-2021 | - | - | - | - | - | - | - | - | - | - | 637 | 620 | 626 | 611 | 2,494 |
| 2021-2022 | - | - | - | - | - | - | - | - | - | - | 620 | 621 | 566 | 573 | 2,380 |
| 2022-2023 | - | - | - | - | - | - | - | - | - | - | 638 | 587 | 611 | 539 | 2,375 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | - | - | - | - | - | - | - | - | - | - | 602 | 622 | 553 | 576 | 2,353 |
| 2024-2025 | - | - | - | - | - | - | - | - | - | - | 513 | 589 | 588 | 523 | 2,213 |
| 2025-2026 | - | - | - | - | - | - | - | - | - | - | 594 | 501 | 555 | 554 | 2,204 |
| 2026-2027 | - | - | - | - | - | - | - | - | - | - | 594 | 586 | 479 | 530 | 2,188 |
| 2027-2028 | - | - | - | - | - | - | - | - | - | - | 582 | 583 | 557 | 456 | 2,178 |
| 2028-2029 | - | - | - | - | - | - | - | - | - | - | 557 | 568 | 550 | 525 | 2,199 |
| 2029-2030 | - | - | - | - | - | - | - | - | - | - | 528 | 543 | 535 | 518 | 2,124 |
| 2030-2031 | - | - | - | - | - | - | - | - | - | - | 560 | 515 | 512 | 504 | 2,091 |
| 2031-2032 | - | - | - | - | - | - | - | - | - | - | 593 | 546 | 485 | 482 | 2,107 |
| 2032-2033 | - | - | - | - | - | - | - | - | - | - | 521 | 579 | 515 | 457 | 2,072 |

## Burbank High School

Ninth Grade retention based on 8th grade enrollment of Muir and 1/2 of 8th grade enrollment at Luther Middle schools.

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | - | - | - | - | - | - | - | - | - | 682 | 633 | 683 | 633 | 2,631 |
| 2014-2015 | - | - | - | - | - | - | - | - | - | - | 648 | 697 | 610 | 651 | 2,606 |
| 2015-2016 | - | - | - | - | - | - | - | - | - | - | 626 | 658 | 681 | 584 | 2,549 |
| 2016-2017 | - | - | - | - | - | - | - | - | - | - | 690 | 621 | 622 | 656 | 2,589 |
| 2017-2018 | - | - | - | - | - | - | - | - | - | - | 666 | 688 | 623 | 600 | 2,577 |
| 2018-2019 | - | - | - | - | - | - | - | - | - | - | 640 | 677 | 664 | 596 | 2,577 |
| 2019-2020 | - | - | - | - | - | - | - | - | - | - | 616 | 635 | 662 | 647 | 2,560 |
| 2020-2021 | - | - | - | - | - | - | - | - | - | - | 657 | 610 | 624 | 627 | 2,518 |
| 2021-2022 | - | - | - | - | - | - | - | - | - | - | 670 | 629 | 604 | 574 | 2,477 |
| 2022-2023 | - | - | - | - | - | - | - | - | - | - | 651 | 671 | 597 | 588 | 2,507 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | - | - | - | - | - | - | - | - | - | - | 635 | 648 | 656 | 573 | 2,512 |
| 2024-2025 | - | - | - | - | - | - | - | - | - | - | 637 | 631 | 632 | 627 | 2,528 |
| 2025-2026 | - | - | - | - | - | - | - | - | - | - | 714 | 700 | 682 | 672 | 2,768 |
| 2026-2027 | - | - | - | - | - | - | - | - | - | - | 667 | 708 | 681 | 651 | 2,707 |
| 2027-2028 | - | - | - | - | - | - | - | - | - | - | 675 | 670 | 698 | 658 | 2,701 |
| 2028-2029 | - | - | - | - | - | - | - | - | - | - | 644 | 669 | 652 | 666 | 2,631 |
| 2029-2030 | - | - | - | - | - | - | - | - | - | - | 664 | 638 | 651 | 622 | 2,576 |
| 2030-2031 | - | - | - | - | - | - | - | - | - | - | 704 | 659 | 621 | 621 | 2,605 |
| 2031-2032 | - | - | - | - | - | - | - | - | - | - | 743 | 698 | 641 | 592 | 2,675 |
| 2032-2033 | - | - | - | - | - | - | - | - | - | - | 635 | 737 | 679 | 612 | 2,663 |

## Independent Learning Academy (ILA)

Forecast year enrollment was determined by 2022-23 ILA share of District grade total.

| | TK | K | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HISTORIC DATA | | | | | | | | | | | | | | | |
| 2013-2014 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2014-2015 | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 | - | 3 |
| 2015-2016 | - | - | - | - | - | - | - | - | - | - | 3 | 10 | 6 | 6 | 25 |
| 2016-2017 | - | - | - | - | - | - | - | - | - | 1 | 2 | 9 | 19 | 6 | 37 |
| 2017-2018 | - | - | - | - | - | - | - | - | - | 3 | 9 | 25 | 26 | 30 | 93 |
| 2018-2019 | - | - | - | - | - | - | - | - | 2 | - | 10 | 20 | 26 | 29 | 87 |
| 2019-2020 | - | - | - | - | - | - | - | - | 3 | 4 | 9 | 10 | 27 | 33 | 86 |
| 2020-2021 | - | - | - | - | - | - | - | - | 5 | 18 | 10 | 20 | 19 | 40 | 112 |
| 2021-2022 | - | - | - | - | - | - | - | - | 7 | 21 | 24 | 29 | 40 | 65 | 186 |
| 2022-2023 | - | - | - | - | - | - | - | 7 | 7 | 15 | 19 | 57 | 81 | 76 | 262 |
| PROJECTIONS | | | | | | | | | | | | | | | |
| 2023-2024 | - | - | - | - | - | - | - | 6 | 8 | 14 | 18 | 58 | 81 | 77 | 263 |
| 2024-2025 | - | - | - | - | - | - | - | 6 | 7 | 16 | 17 | 55 | 82 | 78 | 261 |
| 2025-2026 | - | - | - | - | - | - | - | 6 | 8 | 15 | 19 | 54 | 83 | 83 | 269 |
| 2026-2027 | - | - | - | - | - | - | - | 6 | 7 | 15 | 19 | 59 | 78 | 80 | 264 |
| 2027-2028 | - | - | - | - | - | - | - | 7 | 7 | 15 | 19 | 57 | 84 | 75 | 263 |
| 2028-2029 | - | - | - | - | - | - | - | 7 | 8 | 15 | 18 | 56 | 81 | 80 | 264 |
| 2029-2030 | - | - | - | - | - | - | - | 6 | 8 | 16 | 18 | 54 | 80 | 77 | 257 |
| 2030-2031 | - | - | - | - | - | - | - | 6 | 7 | 16 | 19 | 53 | 76 | 76 | 253 |
| 2031-2032 | - | - | - | - | - | - | - | 6 | 7 | 14 | 20 | 56 | 76 | 72 | 251 |
| 2032-2033 | - | - | - | - | - | - | - | 5 | 7 | 14 | 17 | 60 | 80 | 72 | 255 |

# Appendix D:

# Capacity Analysis

| | | CLASSROOM TYPES | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| School Name | Grade Levels Served | TK-3rd | 4th-5th | ASB | ASL | English | French | Math | Science | Social Studies | Spanish | 9th-12th | Cooking | STEAM | Comp Lab | Dance | Digital Apps | Drama | Engineering | Music | Photo | Art | Tech | Video Production | Health | SPED | ELD | Other |
| Disney | Elementary | 12 | 6 | | | | | | | | | | | | | | | | | | | | | | | 1 | 0 | |
| Jefferson | Elementary | 21 | 8 | | | | | | | | | | | | | | | | | | | | | | | 1 | 0 | |
| McKinley | Elementary | 13 | 6 | | | | | | | | | | | | | | | | | | | | | | | 3 | 0 | |
| Emerson | Elementary | 12 | 4 | | | | | | | | | | | | | | | | | | | | | | | 7 | 0 | |
| Washington | Elementary | 15 | 4 | | | | | | | | | | | | | | | | | | | | | | | 4 | 0 | |
| Bret Harte | Elementary | 15 | 6 | | | | | | | | | | | | | | | | | | | | | | | 4 | 0 | |
| Miller | Elementary | 22 | 7 | | | | | | | | | | | | | | | | | | | | | | | 2 | 0 | 2 |
| Providencia | Elementary | 13 | 4 | | | | | | | | | | | | | | | | | | | | | | | 3 | 0 | |
| Stevenson | Elementary | 16 | 6 | | | | | | | | | | | | | | | | | | | | | | | 3 | 0 | 1 |
| Roosevelt | Elementary | 17 | 6 | | | | | | | | | | | | | | | | | | | | | | | 4 | 0 | |
| Edison | Elementary | 12 | 6 | | | | | | | | | | | | | | | | | | | | | | | 1 | 0 | 1 |
| Huerta | Middle | | | 1 | | 7 | | 7 | 7 | 7 | 1 | | 2 | 2 | 1 | 1 | 1 | 1 | | 1 | | 1 | 1 | | 1 | 6 | 1 | 4 |
| Luther | Middle | | | 2 | | 6 | | 6 | 6 | 6 | 1 | | 1 | | 3 | 1 | 1 | 1 | | 3 | | 1 | 1 | | 1 | 3 | 1 | 2 |
| Muir | Middle | | | 2 | | 8 | | 8 | 8 | 8 | 1 | | 1 | | 3 | 1 | 1 | 1 | | 2 | | 1 | 1 | | 1 | 2 | | |
| Burbank | High | | | 2 | 1 | 15 | 3 | 15 | 15 | 15 | 6 | 72 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 4 | 8 | 1 | 3 |
| Burroughs | High | | | 2 | 1 | 12 | 1 | 11 | 12 | 11 | 5 | 55 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 4 | 15 | 2 | 1 |
| | | | | | | | | | | | | | 53 | | | | | | | | | | | | | | | | |
| Magnolia Park | | | | | | | | | | | | | | | | | | | | | | | | | | 3 | | | |
| Monterey | | | | | | | | | | | | 11 | | | | | | | | | | | | | | | | | |
| Adult | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 27 |
| Horace Mann | | | | | | | | | | | | | | | | | | | | | | | | | | 8 | | | |

| CAPACITY | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| School Name | Grade Levels Served | TK-3rd | 4th-5th (ES) | 6-8th (MS) | 9th-12th | SPED | ELD | Other | Electives | Estimated Max Capacity | 2030-31 Projected Enrollment | Excess Capacity | Estimated Excess Rooms | Cpacacity 85% Utilization at MS/HS | Enrollment 2021-2022 | Total Loadable Rooms |
| Disney | Elementary | 288 | 192 | | | 14 | 0 | 0 | | 494 | 321 | 173 | 5 | | 380 | 19 |
| Jefferson | Elementary | 504 | 256 | | | 14 | 0 | 0 | | 774 | 614 | 160 | 5 | | 740 | 30 |
| McKinley | Elementary | 312 | 192 | | | 42 | 0 | 0 | | 546 | 362 | 184 | 6 | | 440 | 22 |
| Emerson | Elementary | 288 | 128 | | | 98 | 0 | 0 | | 514 | 499 | 15 | 0 | | 591 | 23 |
| Washington | Elementary | 360 | 128 | | | 56 | 0 | 0 | | 544 | 349 | 195 | 6 | | 444 | 23 |
| Bret Harte | Elementary | 360 | 192 | | | 56 | 0 | 0 | | 608 | 471 | 137 | 4 | | 529 | 25 |
| Miller | Elementary | 528 | 224 | | | 28 | 0 | 50 | | 830 | 629 | 201 | 6 | | 748 | 33 |
| Providencia | Elementary | 312 | 128 | | | 42 | 0 | 0 | | 482 | 402 | 80 | 2 | | 417 | 20 |
| Stevenson | Elementary | 384 | 192 | | | 42 | 0 | 25 | | 643 | 503 | 140 | 4 | | 594 | 26 |
| Roosevelt | Elementary | 408 | 192 | | | 56 | 0 | 0 | | 656 | 468 | 188 | 6 | | 569 | 27 |
| Edison | Elementary | 288 | 192 | | | 14 | 0 | 25 | | 519 | 378 | 141 | 4 | | 511 | 20 |
| Huerta | Middle | | | 1802 | | 84 | 20 | 100 | 288 | 2,294 | 848 | 1,446 | 45 | 1,950 | 968 | 53 |
| Luther | Middle | | | 1564 | | 42 | 20 | 50 | 312 | 1,988 | 918 | 1,070 | 33 | 1,690 | 851 | 46 |
| Muir | Middle | | | 1666 | | 28 | 0 | 0 | 288 | 1,982 | 1,486 | 496 | 16 | 1,685 | 1,374 | 49 |
| Burbank | High | | | | 2448 | 112 | 20 | 75 | 504 | 3,159 | 2,605 | 554 | 17 | 2,685 | 2,459 | 177 |
| Burroughs | High | | | | 1870 | 210 | 40 | 25 | 576 | 2,721 | 2,091 | 630 | 20 | 2,313 | 2,338 | 152 |
| | | | | | | | | | | **18,754** | | | | **16,932** | **13,953** | |
| Magnolia Park | | 0 | 0 | | 0 | 42 | 0 | 0 | | 42 | | | | | 19 | 3 |
| Monterey | | 0 | 0 | | 374 | 0 | 0 | 0 | | 374 | | | | | 123 | 11 |
| Adult | | 0 | 0 | | 0 | 0 | 0 | 675 | | 675 | | | | | | 27 |
| Horace Mann | | 0 | 0 | | 0 | 112 | 0 | 0 | | 112 | | | | | 13 | 8 |
| | | | | | | | | | | **19,957** | | | | | **14,108** | |

| | | NON-LOADED CLASSROOM SIZE SPACES | | | | | | | | | | CHILD CARE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| School Name | Grade Levels Served | Total Count of Non-Loadable Rooms | ELD | RTI/Intervention | OT | RSP | Parent Center | STEAM | Music | Comp Lab | Prof. Dev./TOSA | Total Portables | ATB | ASES | Parks and Rec | Boys and Girls Club/YMCA |
| Disney | Elementary | 5 | | 1 | 1** | 1 | | 1 | 1 | | 1 | 2 | 1 | | | |
| Jefferson | Elementary | 3 | | | 1* | | 1 | 1 | 1 | | | 3 | 3 | | | 2 |
| McKinley | Elementary | 4 | 1 | | | | 1 | | 1 | 1 | | 7 | 2 | | | |
| Emerson | Elementary | 6 | 1 | 1 | 1 | 1 | | | 1 | 1 | | 1 | 2 | | 1 | 2 |
| Washington | Elementary | 4 | 2 | 3* | | 1 | | 1* | 1** | 1 | 1* | 0 | 2 | 1 | | |
| Bret Harte | Elementary | 4 | 2* | | 1 | 1 | 1 | 1 | | 1* | | 3 | 5 | | | 2 |
| Miller | Elementary | 7 | 1 | 2 | | | | 1 | 1* | 2 | 1 | 0 | 1 | | 1 | 1 |
| Providencia | Elementary | 5 | 1 | | 1* | | | 1 | 1 | 1 | 1 | 13 | 1 | | | |
| Stevenson | Elementary | 4 | 1** | | | | | 1 | 1 | 1 | 1 | 5 | 2 | | | 2 |
| Roosevelt | Elementary | 5 | 1 | 1 | 1 | | | | 1 | 1 | | 3 | 1 | | | 1 |
| Edison | Elementary | 4 | 1 | | | 1 | | | 1 | 1 | | 5 | 1 | | | 1 |
| Huerta | Middle | 0 | 0 | | | | | | | | | 2 | | | | |
| Luther | Middle | 0 | 0 | | | | | | | | | 0 | | | | |
| Muir | Middle | 0 | 0 | | | | | | | | | 4 | | | | |
| Burbank | High | 0 | 0 | | | | | | | | | 0 | | | | |
| Burroughs | High | 0 | 0 | | | | | | | | | 8 | | | | |
| | | | * Room 54 Shared with RTI **Used with IS, Psych, OT | *36-38 also used for afterschool. 36-37 also used for music. | *Also used for Speech, RTI, Psych and ELD **Also used for ELD | | | *Also used for interventi on | *Also used for OT **Also used for ASES | *Same as music and photo lab | *Room 34 also used for interventi on groups | | | | | |
| Magnolia Park | | 1 | | | | | | | 0 | | | | | | | |
| Monterey | | 1 | | | | | | | 2 | | | | | | | |
| Adult | | 0 | | | | | | | 3 | | | | | | | |
| Horace Mann | | 11 | | | | | | | 6 | 11 | | | | | | 8 |

# Appendix E:
# Cost Analysis

# COST ESTIMATE - PRIORITY 1A

| | 1A | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Building Envelope | | | | Classroom Technology | | | Safety & Security | | | | | Building/Utility Service | | | | | | |
| Row Labels | Sum of Exterior Windows | Sum of Exterior Walls | Sum of Roof | Sum of Exterior Doors | Sum of Classroom Technology | Sum of Technology Infrastructure | Sum of Security reconfig-uration | Sum of New Fencing | Sum of Fire Alarm | Sum of Fire Protection / Suppression | Sum of Domestic Water Distribution | Sum of Electrical Distribution | Sum of Utilities: Sewer line replacement | Sum of Utilities: Electrical Feeder Lines |
| Admin Office | $ 33,257 | $ 249,558 | $ 436,970 | $ 104,408 | $ - | $ - | $ - | $ - | $ - | $ - | $ 63,632 | $ 543,782 | $ - | $ 257,986 |
| Adult School | $ - | $ - | $ 1,581,423 | $ - | $ 348,084 | $ 560,601 | $ 44,265 | $ - | $ 109,025 | $ - | $ - | $ 832,484 | $ 47,603 | $ 386,999 |
| Bret Harte Elementary School | $ 482,994 | $ 153,956 | $ 946,194 | $ 151,468 | $ 373,868 | $ 602,127 | $ 55,331 | $ - | $ - | $ - | $ 11,128 | $ - | $ 60,715 | $ - |
| Burbank High School | $ - | $ 369,105 | $ 4,330,246 | $ 146,171 | $ 2,281,884 | $ 3,675,051 | $ - | $ - | $ 5,133 | $ 100,928 | $ 197,201 | $ 302,202 | $ 252,386 | $ - |
| Community Day School | $ 327,262 | $ 53,771 | $ 263,638 | $ 136,224 | $ - | $ - | $ - | $ - | $ 96,290 | $ - | $ - | $ 43,631 | $ 8,245 | $ 96,750 |
| District Service Center | $ 85,355 | $ 215,966 | $ 1,853,730 | $ 165,083 | $ - | $ - | $ - | $ - | $ - | $ - | $ 12,573 | $ 174,517 | $ - | $ 386,981 |
| Dolores Huerta Middle School | $ - | $ - | $ 3,660,202 | $ - | $ 683,276 | $ 1,100,439 | $ - | $ - | $ 54,268 | $ 81,742 | $ 20,021 | $ 1,142,399 | $ 119,332 | $ 999,707 |
| George Washington Elementary School | $ 77,065 | $ 227,958 | $ 1,804,429 | $ 668,213 | $ 348,084 | $ 560,601 | $ 55,331 | $ 58,752 | $ 5,133 | $ - | $ - | $ 904,162 | $ 46,021 | $ 386,990 |
| Horace Mann | $ 659,038 | $ 304,239 | $ 305,216 | $ 365,430 | $ 244,948 | $ 394,497 | | $ - | | | | | | |
| ILA | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Independent Learning Center | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | | | | | $ - | $ - |
| Joaquin Miller Elementary School | $ 846,814 | $ 14,868 | $ 909,111 | $ 271,462 | $ 515,680 | $ 830,520 | $ - | $ - | $ - | $ - | $ 5,564 | $ 749,836 | $ 67,854 | $ 322,486 |
| John Burroughs High School | $ - | $ 194,144 | $ 2,189,650 | $ 231,844 | $ 1,959,584 | $ 3,155,976 | $ 221,325 | $ - | $ 5,133 | $ - | $ 122,725 | $ 441,982 | $ 287,979 | $ 32,250 |
| John Muir Middle School | $ - | $ - | $ 2,882,890 | $ - | $ 631,708 | $ 1,017,387 | $ - | $ - | $ 54,268 | $ 81,742 | $ 23,967 | $ 897,335 | $ 142,095 | $ 967,458 |
| Luther Burbank Middle School | $ - | $ - | $ 3,442,790 | $ - | $ 593,032 | $ 955,098 | $ - | $ - | $ - | $ 81,742 | $ 152,786 | $ 433,096 | $ 127,343 | $ 290,250 |
| Magnolia Park School | $ - | $ - | $ 172,735 | $ - | $ 51,568 | $ 83,052 | $ - | $ - | $ - | $ - | $ - | $ - | $ 5,925 | $ - |
| Monterey Continuation High School | $ - | $ - | $ 616,487 | $ - | $ 141,812 | $ 228,393 | $ - | $ - | $ 54,268 | $ - | $ 4,192 | $ 433,090 | $ 18,288 | $ 290,236 |
| Providencia Elementary School | $ 415,284 | $ 47,690 | $ 629,741 | $ 240,139 | $ 322,300 | $ 519,075 | $ - | $ - | $ 112,022 | $ - | $ - | $ 360,377 | $ 33,887 | $ 129,000 |
| Ralph Waldo Emerson Elementary School | $ 1,173,628 | $ 231,746 | $ 745,669 | $ 398,964 | $ 373,868 | $ 602,127 | $ 88,530 | $ - | $ - | $ - | $ 13,948 | $ 45,682 | $ 63,363 | $ 96,745 |
| RL Stevenson Elementary School | $ 1,124,655 | $ 175,889 | $ 1,437,052 | $ 437,414 | $ 386,760 | $ 622,890 | $ - | $ 111,859 | $ 107,906 | $ - | $ - | $ 1,135,712 | $ 49,472 | $ 548,226 |
| Theodore Roosevelt Elementary School | $ 1,372,248 | $ 258,651 | $ 1,886,717 | $ 428,075 | $ 412,544 | $ 664,416 | $ 55,331 | $ - | $ 4,192 | $ - | $ 15,320 | $ 16,597 | $ 56,088 | $ 32,250 |
| Thomas Edison Elementary School | $ 961,472 | $ 466,302 | $ 1,722,325 | $ 292,341 | $ 309,408 | $ 498,312 | $ 55,331 | $ - | $ 54,268 | $ - | $ 11,148 | $ 816,035 | $ 42,635 | $ 322,481 |
| Thomas Jefferson Elementary School | $ 1,950,033 | $ 377,713 | $ 2,180,655 | $ 866,589 | $ 425,436 | $ 685,179 | $ 88,530 | $ - | $ - | $ - | $ - | $ 996,972 | $ 55,488 | $ 677,231 |
| Walt Disney Elementary School | $ 1,151,061 | $ 269,267 | $ 580,388 | $ 250,578 | $ 309,408 | $ 498,312 | $ 221,325 | $ - | $ - | $ - | $ - | $ 604,404 | $ 151,520 | $ - |
| William McKinley Elementary School | $ 1,394,811 | $ 167,299 | $ 1,472,901 | $ 187,934 | $ 335,192 | $ 539,838 | $ 110,663 | $ - | $ 54,268 | $ 81,742 | $ - | $ 116,346 | $ 48,937 | $ 257,990 |
| Total Project Cost | $ 12,054,976 | $ 3,778,122 | $ 36,051,158 | $ 5,342,336 | $ 11,048,444 | $ 17,793,891 | $ 995,963 | $ 170,611 | $ 716,174 | $ 427,896 | $ 654,205 | $ 10,990,642 | $ 1,685,176 | $ 6,482,017 |
| Total Project Cost + Contingency/Escalation | $ 16,033,118.57 | $ 5,024,902.88 | $47,948,040.57 | $ 7,105,307.35 | $ 14,694,430.52 | $ 23,665,875.03 | $ 1,324,631.00 | $ 226,912.67 | $ 952,511.94 | $ 569,101.55 | $ 870,092.97 | $ 14,617,554.25 | $ 2,241,283.77 | $ 8,621,082.59 |

# COST ESTIMATE - PRIORITY 1B

| | 1B ADA, Softball | | |
|---|---|---|---|
| Row Labels | Sum of New turf softball field | Sum of ADA Allowance | Sum of Elevators, Lifts, and Escalators |
| Admin Office | | $ 2,390,705 | $ 294,920 |
| Adult School | | $ 2,576,476 | $ - |
| Bret Harte Elementary School | | $ 3,123,787 | $ - |
| Burbank High School | $ 2,223,759 | $ 12,886,429 | $ - |
| Community Day School | | $ 344,103 | $ - |
| District Service Center | | $ 1,767,262 | $ - |
| Dolores Huerta Middle School | | $ 5,838,609 | $ - |
| George Washington Elementary School | | $ 3,083,796 | $ 589,840 |
| Horace Mann | | $ 63,945 | |
| ILA | | $ - | $ - |
| Independent Learning Center | | $ - | |
| Joaquin Miller Elementary School | | $ 3,168,505 | $ 294,920 |
| John Burroughs High School | $ 1,838,174 | $ 15,237,630 | $ 1,179,680 |
| John Muir Middle School | | $ 7,155,620 | $ 589,840 |
| Luther Burbank Middle School | | $ 6,493,780 | $ - |
| Magnolia Park School | | $ 244,723 | $ - |
| Monterey Continuation High School | | $ 1,237,228 | $ - |
| Providencia Elementary School | | $ 1,813,010 | $ - |
| Ralph Waldo Emerson Elementary School | | $ 2,821,181 | $ 294,920 |
| RL Stevenson Elementary School | | $ 2,509,726 | $ - |
| Theodore Roosevelt Elementary School | | $ 2,671,389 | $ 294,920 |
| Thomas Edison Elementary School | | $ 2,389,893 | $ - |
| Thomas Jefferson Elementary School | | $ 2,629,726 | $ - |
| Walt Disney Elementary School | | $ 6,440,069 | $ - |
| William McKinley Elementary School | | $ 2,780,204 | $ - |
| Total Project Cost | $ 4,061,932 | $ 89,667,796 | $ 3,539,041 |
| Total Project Cost + Contingency/Escalation | $ 5,402,369.89 | $ 119,258,169.26 | $ 4,706,924.70 |

# COST ESTIMATE - PRIORITY 2

| Row Labels | Interior Modernizations: Sum of New Building | Sum of Full Mod | Sum of Light Mod | Sum of Classroom Furniture | Sum of Site | Sum of Exterior Stairs | Site Improvements: Sum of Parking Refresh | Sum of Lunch Shelter | Sum of Outdoor Shade Structures/ Furniture | Sum of Landscaping and Fields | Sum of Parking garage | Sum of Rooftops and Parking Canopies | Sum of Play Structures |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Admin Office | | $ 21,546,050 | $ - | $ - | $ - | $ - | $ - | | $ - | $ - | | | $ - |
| Adult School | | $ 17,497,409 | $ 245,845 | $ 810,000 | $ - | $ - | $ 721,098 | | $ - | $ - | | $ 2,870,000 | $ - |
| Bret Harte Elementary School | | $ 22,316,640 | $ 368,768 | $ 870,000 | $ - | $ - | $ 255,579 | $ 446,400 | $ 279,267 | $ 92,895 | | $ 3,240,000 | $ 600,391 |
| Burbank High School | | $ 92,768,479 | $ - | $ 5,310,000 | $ 432,632 | $ - | $ 209,940 | | $ - | $ 422,605 | | $ 3,268,000 | $ - |
| Community Day School | | $ 2,528,021 | $ 169,019 | $ - | $ 5,580 | $ - | $ 83,063 | | $ - | $ - | | | $ - |
| District Service Center | | $ 15,362,678 | $ - | $ - | $ - | $ - | $ - | | $ - | $ - | | $ 633,000 | $ - |
| Dolores Huerta Middle School | | $ 43,862,310 | $ - | $ 1,590,000 | $ 320,626 | $ - | $ 237,323 | $ 669,600 | $ 558,534 | $ 266,909 | | | $ - |
| George Washington Elementary School | | $ 16,915,660 | $ 897,336 | $ 810,000 | $ 589,181 | $ - | $ 543,105 | $ 446,400 | $ 279,267 | $ 99,437 | | $ 4,101,000 | $ 300,196 |
| Horace Mann | | | | | | | | | | | | | $ - |
| ILA | | $ - | | $ - | $ - | $ - | $ - | | $ - | $ - | | | $ - |
| Independent Learning Center | | $ - | $ - | $ - | | | $ - | | $ - | $ - | | | $ - |
| Joaquin Miller Elementary School | | $ 24,940,985 | $ - | $ 1,200,000 | $ - | $ - | $ - | | $ 279,267 | $ 91,586 | | | $ - |
| John Burroughs High School | | $ 105,851,369 | $ 245,845 | $ 4,560,000 | $ 4,569,110 | $ - | $ 871,469 | | $ - | $ 399,055 | $ 6,838,403 | $ 3,797,000 | $ - |
| John Muir Middle School | | $ 52,229,146 | $ - | $ 1,470,000 | $ 1,303,430 | $ - | $ 438,135 | | $ 558,534 | $ 215,882 | | $ 3,378,000 | $ - |
| Luther Burbank Middle School | | $ 46,806,845 | $ 368,768 | $ 1,380,000 | $ 775,399 | $ - | $ 392,496 | $ 669,600 | $ 558,534 | $ 396,488 | | $ 2,612,000 | $ - |
| Magnolia Park School | | $ 2,177,753 | $ - | $ 120,000 | $ - | $ - | $ - | | $ - | $ - | | | $ - |
| Monterey Continuation High School | | $ 6,722,100 | $ 307,307 | $ 330,000 | $ - | $ - | $ 118,662 | | $ 279,267 | $ 340,000 | | | $ - |
| Providencia Elementary School | $ 15,335,720 | $ 8,899,853 | $ 726,652 | $ 750,000 | $ - | $ - | $ 219,068 | | $ 279,267 | $ 130,838 | | $ 3,833,000 | $ - |
| Ralph Waldo Emerson Elementary School | $ 1,489,582 | $ 22,316,768 | $ 614,613 | $ 870,000 | $ - | $ 1,027 | $ 118,662 | $ 446,400 | $ 279,267 | $ 37,948 | | | $ - |
| RL Stevenson Elementary School | $ 5,792,764 | $ 15,001,369 | $ 1,663,604 | $ 900,000 | $ - | $ - | $ 451,827 | $ 446,400 | $ 1,117,069 | $ 139,996 | | | $ - |
| Theodore Roosevelt Elementary School | | $ 17,806,178 | $ 1,153,041 | $ 960,000 | $ 1,611,779 | $ - | $ 191,684 | | $ 279,267 | $ 85,044 | | | $ - |
| Thomas Edison Elementary School | | $ 15,671,066 | $ 512,178 | $ 720,000 | $ 461,935 | $ - | $ 82,150 | $ 446,400 | $ 1,160,000 | $ 115,137 | | | $ - |
| Thomas Jefferson Elementary School | $ 8,499,140 | $ 18,452,270 | $ 1,145,230 | $ 990,000 | $ 102,897 | $ 1,540 | $ 109,534 | $ 446,400 | $ 279,267 | $ 134,763 | | | $ - |
| Walt Disney Elementary School | $ 10,516,221 | $ 55,693,753 | $ 122,923 | $ 720,000 | $ 762,019 | $ - | $ - | $ 446,400 | $ 279,267 | $ 31,401 | | $ 1,336,000 | $ 300,196 |
| William McKinley Elementary School | | $ 17,987,404 | $ 368,768 | $ 780,000 | $ 3,487,247 | $ - | $ 19,168 | $ 446,400 | $ 279,267 | $ 6,149 | | | $ - |
| Total Project Cost | $ 41,633,428 | $ 643,354,108 | $ 8,909,897 | $ 25,140,000 | $ 14,421,835 | $ 2,566 | $ 5,062,964 | $ 4,910,400 | $ 6,745,344 | $ 3,006,078 | $ 6,838,403 | $ 29,068,000 | $ 1,200,783 |
| Total Project Cost + Contingency/Escalation | $ 55,372,458.81 | $855,660,963.12 | $ 11,850,162.93 | $ 33,436,200.00 | $ 19,181,040.55 | $ 3,413.19 | $ 6,733,741.80 | $6,530,832.00 | $ 8,971,307.49 | $ 3,998,083.52 | $ 9,095,075.46 | $ 38,660,440.00 | $ 1,597,041.01 |

| Row Labels | HVAC: Sum of Play Structure Shade? | Sum of Rubberized Surface | Sum of Mechanical / HVAC | Sum of Ductwork | Sum of Interior Walls | Sum of Lighting | Misc Deferred Maintenance: Sum of Other Electrical Systems | Sum of Other Plumbing | Sum of Plumbing Fixtures | Sum of EMS Controls |
|---|---|---|---|---|---|---|---|---|---|---|
| Admin Office | $ - | $ - | $ 836,505 | $ 97,151 | $ - | $ - | $ 92,356 | $ 64,587 | $ 21,682 | $ 88,393 |
| Adult School | $ - | $ - | $ 1,079,660 | $ 125,390 | $ - | $ - | $ - | $ - | $ 14,513 | $ 71,784 |
| Bret Harte Elementary School | $ 325 | $ 169,020 | $ - | $ - | $ - | $ 16,919 | $ - | $ - | $ 57,487 | $ 91,555 |
| Burbank High School | $ - | $ - | $ 9,844,749 | $ 1,143,357 | $ - | $ - | $ - | $ - | $ 282,236 | $ 380,585 |
| Community Day School | $ - | $ - | $ 175,308 | $ 20,360 | $ - | $ 34,384 | $ - | $ - | $ 29,677 | $ 12,433 |
| District Service Center | $ - | $ - | $ 367,723 | $ 42,707 | $ - | $ 463,771 | $ - | $ 88,119 | $ 77,527 | $ 63,026 |
| Dolores Huerta Middle School | $ - | $ - | $ 90,913 | $ 10,559 | $ - | $ - | $ - | $ 153,978 | $ 297,677 | $ 179,946 |
| George Washington Elementary School | $ 649,010 | $ 84,510 | $ 299,872 | $ 34,827 | $ - | $ - | $ - | $ - | $ 214,393 | $ 69,397 |
| Horace Mann | $ - | $ - | | | | | | | | |
| ILA | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Independent Learning Center | $ - | $ - | | $ - | | | | | | $ - |
| Joaquin Miller Elementary School | $ - | $ - | $ 621,248 | $ 72,151 | $ - | $ 51,076 | $ - | $ - | $ 216,670 | $ 102,321 |
| John Burroughs High School | $ - | $ - | $ 8,888,505 | $ 1,032,300 | $ - | $ 15,281 | $ - | $ 131,175 | $ 605,727 | $ 434,258 |
| John Muir Middle School | $ - | $ - | $ 2,728,340 | $ 315,937 | $ - | $ - | $ - | $ 232,528 | $ 601,401 | $ 214,272 |
| Luther Burbank Middle School | $ - | $ - | $ 176,012 | $ 20,442 | $ - | $ 80,389 | $ - | $ - | $ 194,341 | $ 192,026 |
| Magnolia Park School | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 8,934 |
| Monterey Continuation High School | $ - | $ - | $ 757,373 | $ 87,960 | $ - | $ 39,589 | $ - | $ 1,149,706 | $ - | $ 27,578 |
| Providencia Elementary School | $ - | $ - | $ 519,174 | $ 60,296 | $ - | $ - | $ - | $ - | $ 27,106 | $ 36,512 |
| Ralph Waldo Emerson Elementary School | $ - | $ - | $ 83,027 | $ 9,643 | $ - | $ 15,281 | $ - | $ - | $ 21,684 | $ 95,548 |
| RL Stevenson Elementary School | $ - | $ - | $ 829,921 | $ 96,386 | $ 2,975 | $ 82,767 | $ - | $ - | $ 103,057 | $ 74,601 |
| Theodore Roosevelt Elementary School | $ - | $ - | $ 1,073,386 | $ 124,662 | $ - | $ - | $ - | $ - | $ 329,791 | $ 84,577 |
| Thomas Edison Elementary School | $ - | $ - | $ 963,895 | $ 111,946 | $ - | $ - | $ - | $ - | $ 247,328 | $ 66,291 |
| Thomas Jefferson Elementary School | $ - | $ - | $ 115,305 | $ 13,461 | $ - | $ 29,683 | $ - | $ - | $ 143,972 | $ 83,673 |
| Walt Disney Elementary School | $ 275,829 | $ 35,917 | $ 785,894 | $ 91,273 | $ - | $ - | $ - | $ - | $ 284,708 | $ 228,485 |
| William McKinley Elementary School | $ - | $ - | $ 1,154,734 | $ 134,109 | $ - | $ - | $ - | $ - | $ 43,364 | $ 73,794 |
| Total Project Cost | $ 925,163 | $ 289,447 | $ 31,384,143 | $ 3,644,916 | $ 2,975 | $ 829,139 | $ 92,356 | $ 1,820,093 | $ 3,814,344 | $ 2,677,991 |
| Total Project Cost + Contingency/Escalation | $ 1,230,467.31 | $ 384,964.09 | $ 41,740,910.41 | $ 4,847,737.94 | $ 3,956.57 | $ 1,102,755.07 | $ 122,833.86 | $ 2,420,724.02 | $ 5,073,078.00 | $ 3,561,727.86 |

# COST ESTIMATE - PRIORITY 3

| | Portables | | 3 Enhanced Learning and Support Spaces | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Row Labels | Sum of Portables | Sum of OT/PT | Sum of Wellness center reconfiguration | Sum of STEAM-STEM reconfiguration | Sum of Science/Elective Upgrades | Sum of Kitchen Overhaul | Sum of Dining Refresh | Sum of Convert Space to Restroom2 | Performing arts space improvements | School Total |
| Admin Office | $ - | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 27,121,943 |
| Adult School | $ - | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 29,922,659 |
| Bret Harte Elementary School | $ - | | $ - | $ 58,830 | $ 218,758 | $ 764,871 | $ 223,991 | $ 63,008 | $ - | $ 36,096,270 |
| Burbank High School | $ - | | $ 391,476 | $ 235,319 | $ 1,750,065 | $ 2,294,613 | $ 587,632 | $ 504,062 | $ 5,000,000 | $ 151,596,243 |
| Community Day School | $ - | | $ - | $ - | $ - | $ - | $ 138,266 | $ - | $ - | $ 4,566,025 |
| District Service Center | $ - | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 21,760,019 |
| Dolores Huerta Middle School | $ 177,383 | | $ 260,984 | $ 1,294,253 | $ 437,516 | $ 3,441,919 | $ 331,839 | $ 180,022 | $ 3,000,000 | $ 71,062,288 |
| George Washington Elementary School | $ 266,075 | $ 416,000 | $ 91,000 | $ 58,830 | $ 218,758 | $ 764,871 | $ - | $ - | $ - | $ 36,965,499 |
| Horace Mann | | | | | | | | $ - | | $ 2,337,313 |
| ILA | $ - | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Independent Learning Center | $ - | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Joaquin Miller Elementary School | $ 88,692 | | $ 91,000 | $ 58,830 | $ 218,758 | $ 764,871 | $ 189,425 | $ - | $ - | $ 36,984,500 |
| John Burroughs High School | $ 354,766 | | $ 391,476 | $ 235,319 | $ 1,750,065 | $ 2,294,613 | $ - | $ 220,527 | $ 5,000,000 | $ 175,584,338 |
| John Muir Middle School | $ 88,692 | | $ 521,968 | $ 235,319 | $ 437,516 | $ 1,529,742 | $ 505,225 | $ 243,030 | $ 3,000,000 | $ 84,683,405 |
| Luther Burbank Middle School | $ - | | $ 260,984 | $ 117,659 | $ 3,106,365 | $ 3,441,919 | $ 304,186 | $ 450,055 | $ 3,000,000 | $ 77,874,375 |
| Magnolia Park School | $ - | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 2,864,691 |
| Monterey Continuation High School | $ - | | $ - | $ 58,830 | $ 218,758 | $ 764,871 | $ - | $ - | $ 5,000,000 | $ 19,225,994 |
| Providencia Elementary School | $ - | | $ - | $ - | $ 218,758 | $ 764,871 | $ 188,042 | $ - | $ - | $ 36,611,683 |
| Ralph Waldo Emerson Elementary School | $ - | | $ 130,000 | $ 58,830 | $ 218,758 | $ 764,871 | $ 550,300 | $ - | $ - | $ 35,072,577 |
| RL Stevenson Elementary School | $ - | $ 91,000 | $ 91,000 | $ 58,830 | $ 218,758 | $ 764,871 | $ - | $ - | $ - | $ 36,574,756 |
| Theodore Roosevelt Elementary School | $ 88,692 | $ 130,000 | $ - | $ 58,830 | $ 218,758 | $ 764,871 | $ 290,359 | $ - | $ - | $ 33,419,656 |
| Thomas Edison Elementary School | $ 29,564 | | $ - | $ 58,830 | $ 218,758 | $ 764,871 | $ 190,531 | $ - | $ - | $ 29,760,833 |
| Thomas Jefferson Elementary School | $ 59,128 | | $ 65,000 | $ 58,830 | $ 218,758 | $ 764,871 | $ 212,377 | $ - | $ - | $ 42,860,250 |
| Walt Disney Elementary School | $ 118,692 | | $ - | $ 58,830 | $ 218,758 | $ 764,871 | $ 179,193 | $ - | $ - | $ 83,726,963 |
| William McKinley Elementary School | $ 147,819 | $ 91,000 | $ 91,000 | $ 58,830 | $ 218,758 | $ 764,871 | $ 252,198 | $ - | $ - | $ 33,953,004 |
| Total Project Cost | $ 1,419,502 | $ 728,000 | $ 2,385,886 | $ 2,764,995 | $ 10,106,623 | $ 22,181,255 | $ 4,143,564 | $ 1,660,703 | $ 24,000,000 | $ 1,110,625,284 |
| Total Project Cost + Contingency/Escalation | $ 1,887,937.26 | $ 968,240.00 | $ 3,173,229.03 | $ 3,677,443.88 | $ 13,441,809.01 | $ 29,501,069.14 | $ 5,510,939.56 | $ 2,208,735.11 | $ 31,920,000.00 | $ 1,477,131,627.33 |

# Appendix F:

# Site Profiles and Potential Projects

# 1.1 BRET HARTE ELEMENTARY SCHOOL



School Entry



School Entry


Parking

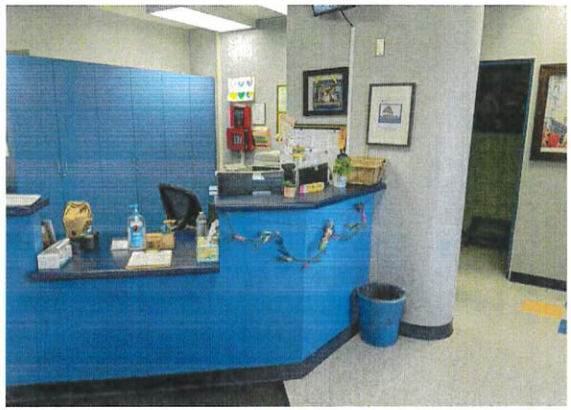

Building 3


Playground


Childcare Center

02 SITE PROFILES

# 1.2 BRET HARTE ELEMENTARY SCHOOL



Staff Office



Hallway



Classroom - Grade 1-5



Classroom - Pre K



Library



Staff Office

# 1.3 BRET HARTE ELEMENTARY SCHOOL

## FACILITY

| | |
|---|---|
| Address | 3200 Jeffries Ave<br>Burbank, CA 91505 |
| Year Constructed | 1941 BLDG 1<br>1941 BLDG 2<br>1941 BLDG 7<br>1968 Portable Classroom 25<br>1972 Portable Classroom SE<br>1988 Portable Classroom 24<br>2015 BLDG 3<br>2015 BLDG 4 |
| Acreage | 7.3 ac |
| Estimated Capacity | 608 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 9 | 65,064 sf |
| Permanent | 6 | 62,184 sf |
| Portable | 3 | 2,880 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK - 5 |
| Special Programs | LEAP, SPED, Speech/Language services, Resource Program, Occupational Therapy, specialized academic instruction |




Source: *GOOGLE MAPS 2022*

02 SITE PROFILES

# 1.4 BRET HARTE ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Special Ed | Rooms |
|---|---|
| TK | 1 |
| Kinder | 3 |
| Grades 1 - 3 | 11 |
| Grades 4 - 5 | 6 |
| Special Ed | 4 |
| Potential Classrooms | 1 |
| **Teaching Spaces Subtotal** | **26** |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) | |
| Support Spaces (Gym, Cafeteria/Kitchen, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, FSA) | |
| Service | |
| Child Care (ATB, P&R, B&G) | 7 |

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#



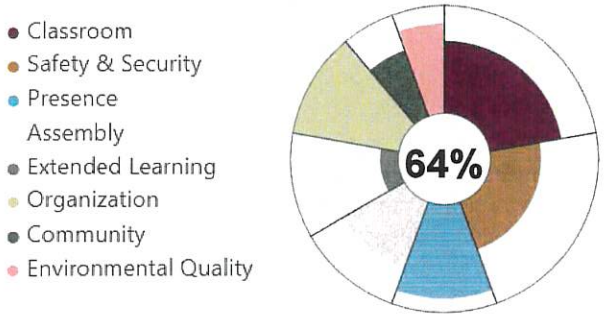

Source: *GOOGLE MAPS 2022*

# 1.5 BRET HARTE ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Have a clear and consistent vision
3. Address the needs of students of all abilities
4. Provide equitable improvements across all schools
5. Modernize classrooms

## Educational Adequacy Scores




## Site Request Needs

**Grounds**
- Limited shading outdoors, old play structure, very little green space, need new lunch shelter outdoors
- Childcare gate is an easy access point, no monitoring at building 2 fence

**Buildings**
- More restrooms for students and staff

**Programs**
- Would like STEAM lab, overcrowded and no space for FSA

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to pages 42-43.
- For site scope list and budgets refer to page Appendix E.
- **Plumbing Fixtures:** The stainless steel combination water cooler/sinks in the classrooms were either approaching or had exceeded their expected useful life. The water coolers were disassembled and non-operational, surpassing their expected useful life.
- **Exterior Doors:** The painted surface on the exterior doors was faded, indicating potential aging or weathering.
- **Roof:** The roof covering showed signs of ponding, potentially indicating water retention issues.
- **Domestic Water Distribution:** The water heater in the staff restroom was reaching the end of its expected useful life, suggesting potential inefficiency or impending need for replacement.
- **Portables:** The roof covering, along with mechanical equipment, gutters, downspouts, exterior windows, and doors were assessed and showed signs of moderate deterioration, potentially exceeding their typical expected useful life.
- **Play Structure:** The play structure was described as old and worn out, indicating a need for potential refurbishment or replacement.
- **Bungalows:**
  - Modernize 3 bungalows
- **Site:**
  - Build 2 new play structures
  - Build new 1600sqft lunch shelter
- **Main Building**
  - Reconfigure entry to accommodate new 500sf security vestibule
  - Convert 600 sf for restroom

# 2.1 GEORGE WASHINGTON ELEMENTARY SCHOOL



School Entry


Playground


Courtyard


Building 1


Building 11


Building 25

# 2.2 GEORGE WASHINGTON ELEMENTARY SCHOOL



Classroom - Grade 1-5



Lunch Shelter



Staff Office



Classroom - Grade 1-5



Auditorium



Library

# 2.3 GEORGE WASHINGTON ELEMENTARY SCHOOL

## FACILITY

| | |
|---|---|
| Address | 2322 N Lincoln St, Burbank, CA 91504 |
| Year Constructed | 1934 BLDG 1<br>1934 BLDG 4<br>1934 BLDG 6<br>1987 BLDG 5<br>1994 BLDG 3<br>1994 BLDG 2<br>1998 BLDG 11 |
| Acreage | 6.4 ac |
| Estimated Capacity | 544 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 7 | 51,150 sf |
| Permanent | 7 | 51,150 sf |
| Portable | 0 | 0 |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK-5 |
| Special Programs | DHH, English Learner, GATE, Second Step, RSP, ASES |




Source: *GOOGLE MAPS 2022*

# 2.4 GEORGE WASHINGTON ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| TK | 2 |
| Kinder | 3 |
| Grades 1 - 3 | 10 |
| Grades 4 - 5 | 4 |
| Special Ed | 4 |
| Potential Classrooms | 0 |
| **Teaching Spaces Subtotal** | 23 |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) | |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT) | |
| Child Care (ATB, P&R, B&G) | 6 |

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#



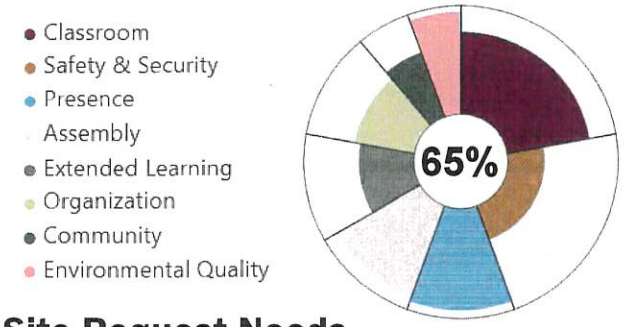

Source: *GOOGLE MAPS 2022*

# 2.5 GEORGE WASHINGTON ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Address the needs of students of all abilities
3. Modernize cafeterias and multi-purpose rooms
4. Improve educational technology
5. Modernize classrooms

## Educational Adequacy Scores




## Site Request Needs

**Grounds**
- Garden has issues with maintenance and care

**Buildings**
- Smaller rooms needed
- Library roof leaks

**Programs**
- Would love an outdoor science room
- Auditorium can't fit the whole school's enrollment (280 capacity)
- Wants flexible space for support (OT, Adaptive PE, etc...)
- Auditorium used for SPED, which is not ideal

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.
- **Elevators:** The elevator systems are nearing or have reached the end of their expected life span.
- **Electrical Distribution:** Interior and exterior switch gear, as well as panel boards, show signs of either exceeding or nearing the end of their anticipated useful life.
- **Exterior Doors and Walls:** Exterior doors exhibit fading, difficulty in operation, and corrosion, while walls display minor cracking and severe deterioration in various components.
- **Mechanical / HVAC:** Rooftop units showed damaged fins, used outdated refrigerant, and exceeded their anticipated useful life.
- **Plumbing Fixtures:** Multi-occupant restrooms and stainless steel water fixtures are approaching or have surpassed their expected useful life.
- **Roofing:** Roofs show signs of wear, minor deterioration, severe corrosion, and components beyond their typical lifespan, potentially causing drainage issues.
- **Site:** The campus structures, like covered walkways, demonstrate deterioration beyond their expected useful life, including corroded metal elements and rotten wooden components.
- **Site:**
  - Build bike racks
  - Add new higher fencing along south edge of site
  - Build new upper grade play structure with shade and new rubberized flooring
- **Main Building:**
  - Consolidate Offices into (3) classrooms and (1) wellness space
  - Reconfigure CC3 into adaptive PE/Parent Center
  - Reconfigure entry to accommodate new 500sf security vestibule

# 3.1 JOAQUIN MILLER ELEMENTARY SCHOOL



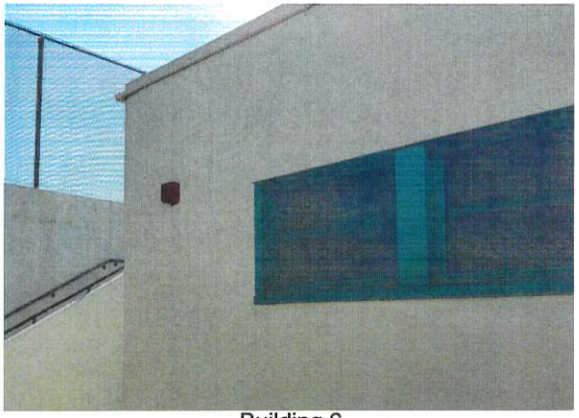
Playground



Lunch Shelter



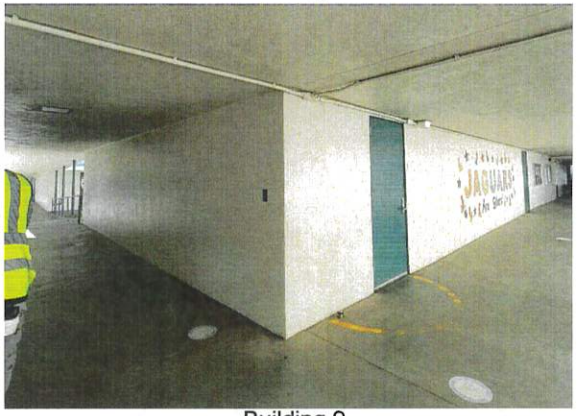
Building 5



Building 6



Lunch Shelter



Building 9

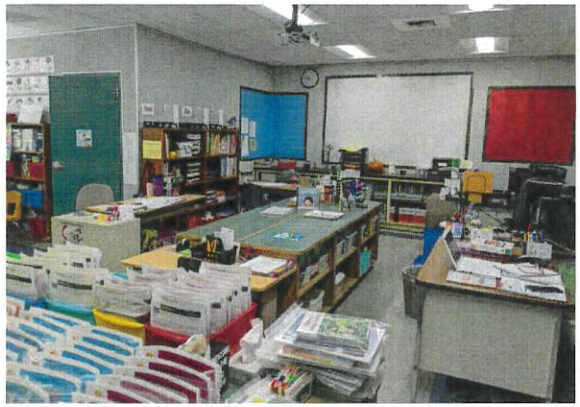
# 3.2 JOAQUIN MILLER ELEMENTARY SCHOOL



Classroom - Grade 1-5



Staff Office



Staff Office



Auditorium



Cafeteria



Library

# 3.3 JOAQUIN MILLER ELEMENTARY SCHOOL

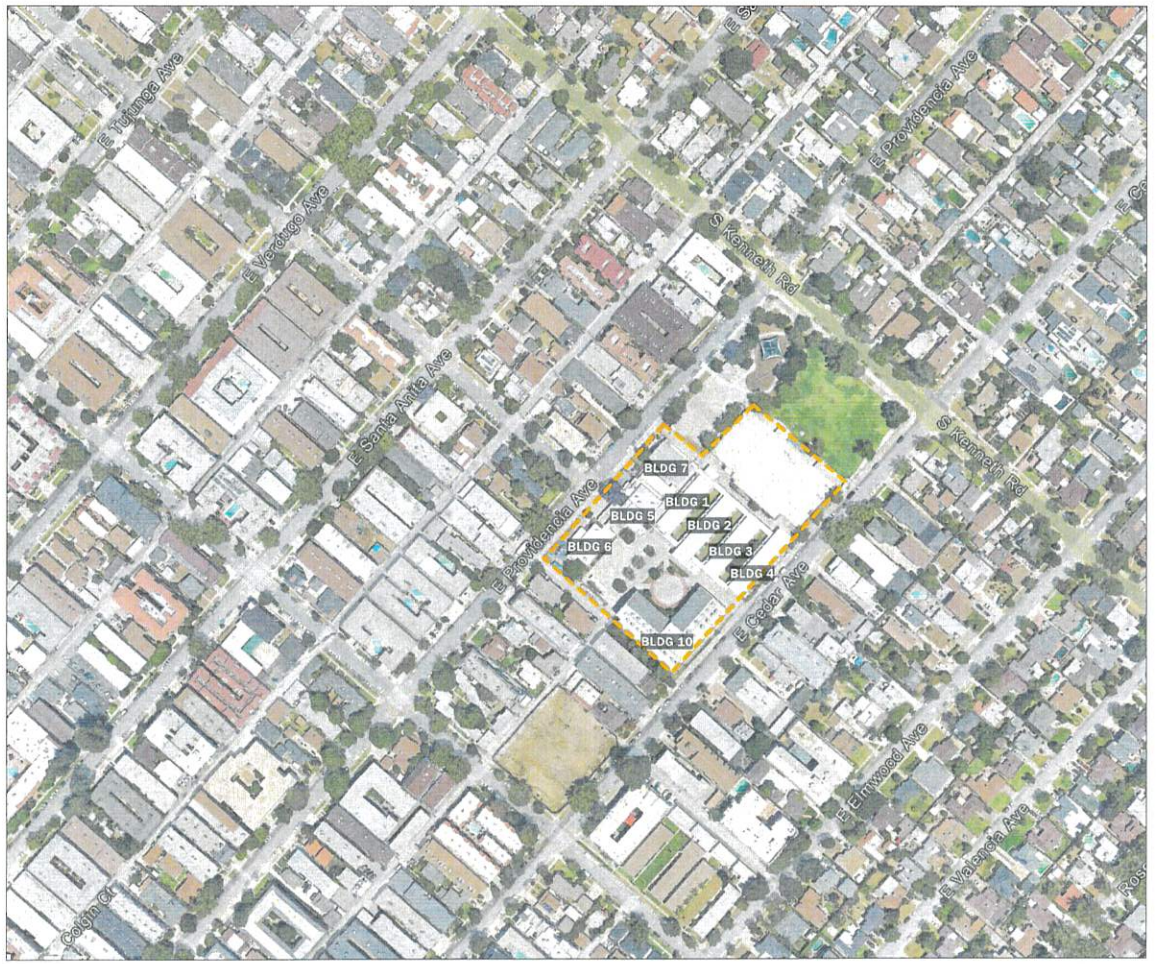
## FACILITY

| | |
|---|---|
| Address | 720 E Providencia Ave, Burbank, CA 91501 |
| Year Constructed | 1949 BLDG 7<br>1955 BLDG 5<br>1955 BLDG 6<br>1955 BLDG 1<br>1955 BLDG 2<br>1955 BLDG 3<br>1955 BLDG 4<br>1998 BLDG 10 |
| Acreage | 5.7 |
| Estimated Capacity | 830 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 8 | 96,736 sf |
| Permanent | 8 | 96,736 sf |
| Portable | 0 | 0 |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK-5 |
| Special Programs | DHH, GATE, ELD, RSP,BSP |




Source: *GOOGLE MAPS 2022*

02 SITE PROFILES

# 3.4 JOAQUIN MILLER ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| TK | 2 |
| Kinder | 5 |
| Grades 1 - 3 | 17 |
| Grades 4 - 5 | 7 |
| Special Ed (BSP - Behavioral Support) | 2 |
| Potential Classrooms | 0 |
| **Teaching Spaces Subtotal** | 33 |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) | |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT ) | |
| Child Care (ATB, P&R, B&G ) | 3 |

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

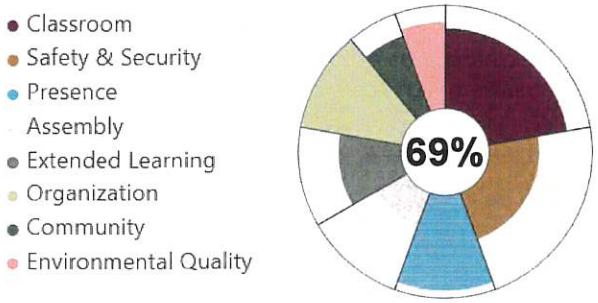
02 SITE PROFILES

# 3.5 JOAQUIN MILLER ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Address the needs of students of all abilities
3. Include all voices and stakeholders
4. Have a clear and consistent vision
5. Expand access to early childhood opportunities (4 and under)

## Educational Adequacy Scores




## Site Request Needs

**Grounds**
- Kindergarten gate can't be locked and exposed to main street

**Buildings**
- Roof needs to be redone

**Programs**
- Lunch shelter is small
- Convert one computer lab to STEAM lab
- Need MRP, shade structure/ solar, outdoor space, upgrade auditorium
- TK does not have restrooms

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.

- **Main Building:**
  - Reconfigure learning center to offices and wellness center
- **Site:**
  - The covered walkway was in poor condition. The wooden components were severely deteriorated and there was excessively peeling paint. The roof covering had significant wear and deterioration.
  - Build new 1600sf lunch shelter

# 4.1 PROVIDENCIA ELEMENTARY SCHOOL



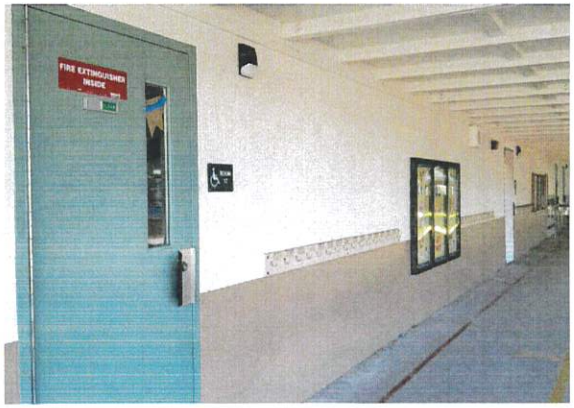
School Entry


Gate


Basketball Court


Courtyard


Classroom 13



Classroom 9-12

# 4.2 PROVIDENCIA ELEMENTARY SCHOOL



Classroom - Grade 1-5



Classroom - Pre K



Hallway



Staff Office



Auditorium



Library

# 4.3 PROVIDENCIA ELEMENTARY SCHOOL

## FACILITY

| | |
|---|---|
| Address | 1919 N Ontario St,<br>Burbank, CA91505 |
| Year Constructed | 1951 BLDG 1<br>1951 BLDG 7<br>1951 BLDG 4<br>1951 BLDG 8<br>1951 BLDG 3<br>1951 BLDG 2<br>1953 BLDG 5<br>1995 BLDG 6<br>1998 BLDG 9 |
| Acreage | 7.13 ac |
| Estimated Capacity | 482 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 18 | 32,444 sf |
| Permanent | 6 | 20,924 sf |
| Portable | 12 | 11,520 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK-5 |
| Special Programs | ELD, GATE, RTI, SDC, ASES, RSP |




Source: *GOOGLE MAPS 2022*

02 SITE PROFILES

# 4.4 PROVIDENCIA ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| TK | 1 |
| Kinder | 3 |
| Grades 1 - 3 | 9 |
| Grades 4 - 5 | 4 |
| Special Ed | 3 |
| Potential Classrooms | 0 |
| **Teaching Spaces Subtotal** | 20 |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) | |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA/Current Lab, Parent Center, RSP, SAI, OT) | |
| Child Care (ATB, P&R, B&G, ASES) | 2 |

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#



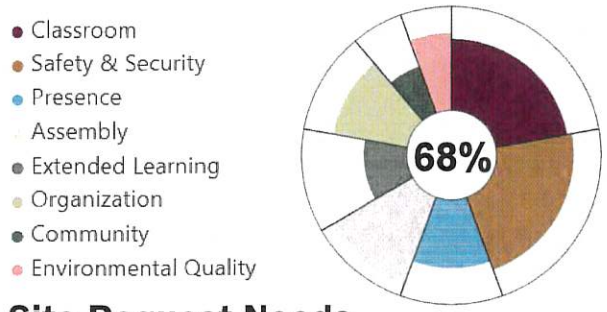

Source: *GOOGLE MAPS 2022*

# 4.5 PROVIDENCIA ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Address the needs of students of all abilities
3. Have a clear and consistent vision
4. Include all voices and stakeholders
5. Provide more spaces for music and art

## Educational Adequacy Scores




## Site Request Needs

**Grounds**
- Fence used to have mesh covering, play yard close to adjacent companies needs more security

**Buildings**
- Stucco damage needs to be repaired
- Flex space for PE

**Programs**
- Need more classrooms in upcoming years, bungalow replacement for adequate number of classrooms
- Would like to make computer lab a STEAM space

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.
- **Main Building:**
  - Removal of (8) portables and build a new building for the following programs:
    - Library / STEAM Lab
    - Parent Room
    - OT, IEP Large Conference Room
    - Music/Child Care
    - Learning Center
    - RSP, RTI, TOSA/PD, ELD, Classroom
- **Bungalows**
  - Full renovation of the remaining (4) bungalows

# 5.1 RALPH WALDO EMERSON ELEMENTARY SCHOOL



Play Area



Building 3



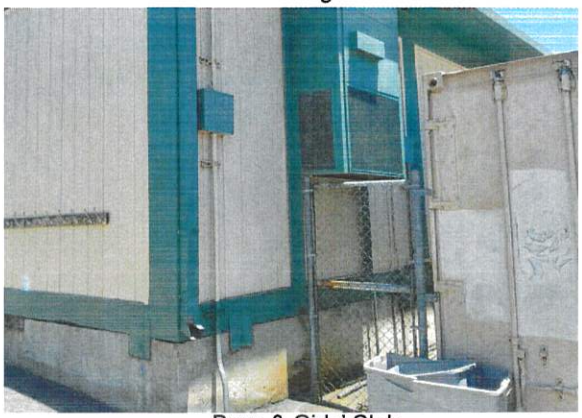
Building 11



Boys & Girls' Club



Boys & Girls' Club



Boys & Girls' Club

# 5.2 RALPH WALDO EMERSON ELEMENTARY SCHOOL



Hallway



Classroom - Pre K




Auditorium



Classroom - Grade 1-5



Cafeteria




Library

# 5.3 RALPH WALDO EMERSON ELEMENTARY SCHOOL

## FACILITY

| | |
|---|---|
| Address | 720 E Cypress Ave,<br>Burbank, CA 91501 |
| Year Constructed | 1929 BLDG 1<br>1929 BLDG 1B<br>1939 BLDG 5<br>1956 BLDG 2<br>1967 BLDG 6<br>1989 BLDG 4<br>1998 BLDG 11<br>2016 BLDG 3 |
| Acreage | 4.8 ac |
| Estimated Capacity | 518 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 5 | 54,709 sf |
| Permanent | 4 | 53,749 sf |
| Portable | 1 | 960 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK - 5 |
| Special Programs | RTI, RSP, ELD, GATE, CLC, SDC |




Source: *GOOGLE MAPS 2022*

# 5.4 RALPH EMERSON ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| TK | 1 |
| Kinder | 2 |
| Grades 1 - 3 | 8 |
| Grades 4 - 5 | 4 |
| Special Ed | 9 |
| Potential Classrooms | 0 |
| **Teaching Spaces Subtotal** | 24 |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) | |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT) | |
| Child Care (ATB, P&R, B&G) | 4 |

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

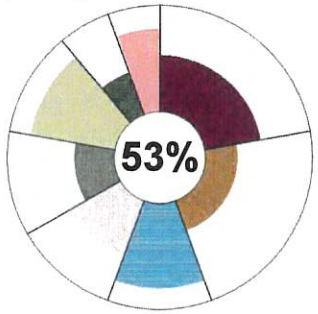
# 5.5 RALPH EMERSON ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Have a clear and consistent vision
3. Enhance before and after school programming
4. Modernize classrooms
5. Provide more spaces for music and art

## Educational Adequacy Scores

- Classroom
- Safety & Security
- Presence
- Assembly
- Extended Learning
- Organization
- Community
- Environmental Quality




## Site Request Needs

**Grounds**
- Campus is open on weekends for community use, gate left open, would like to reconfigure office

**Buildings**
- HVAC controls not working so some rooms get stuck in extreme temperatures, indoor hall stairs not up to code, plumbing problems, issue with window treatments and seals, would like lighting replacement

**Programs**
- Not enough dining space for students, small library struggles to hold one class, difficult to complete pick up and drop off

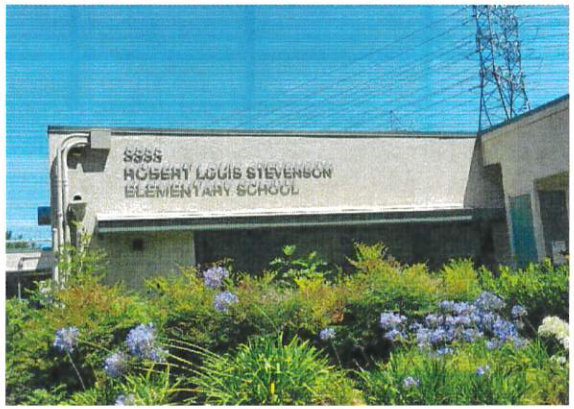
## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.
- **Bungalows:**
  - Add 2 bungalows next to boys and girls club
  - Add 1 portable outdoor bathroom
- **Main Buildings:**
  - Reconfigure computer lab to STEAM room
  - Reconfigure library to wellness center
  - Reconfigure ATB rooms to classrooms
  - Build new 1600sf lunch shelter
  - Reconfigure rooms 17&15 into 1 library

# 6.1 R.L. STEVENSON ELEMENTARY SCHOOL



School Entry




Building 1



Building 2



Building 3



Building 4



Building 5

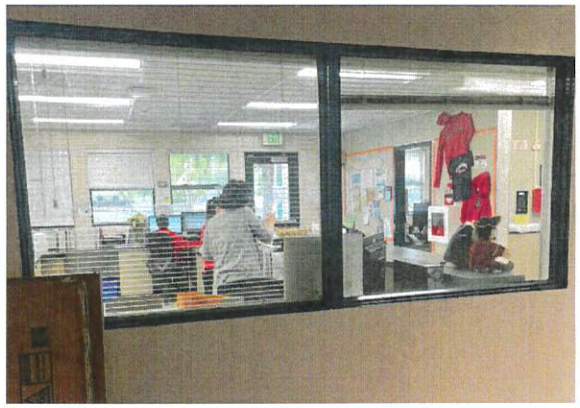
# 6.2 R.L. STEVENSON ELEMENTARY SCHOOL



Hallway



Hallway



Staff Office



Classroom - Pre K



Classroom - Grade 1-5



Auditorium

# 6.3 R.L. STEVENSON ELEMENTARY SCHOOL

## FACILITY

| | |
|---|---|
| Address | 3333 W Oak St,<br>Burbank CA 91505 |
| Year Constructed | 1946 BLDG 1<br>1946 BLDG 2<br>1946 BLDG 4<br>2019 BLDG 6<br>1948 BLDG 3<br>1948 BLDG 5<br>1997 B1<br>1998 B2<br>1999 B3<br>2020 B4 |
| Acreage | 7.23 ac |
| Estimated Capacity | 643 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 10 | 61,706 sf |
| Permanent | 6 | 47,762 sf |
| Portable | 4 | 13,944 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK - 5 |
| Special Programs | ELD, GATE, Stepping Stones, Severe, RTI, RSP |




Source: *GOOGLE MAPS 2022*

# 6.4 R.L. STEVENSON ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| TK | 2 |
| Kinder | 3 |
| Grades 1 - 3 | 11 |
| Grades 4 - 5 | 6 |
| Special Ed | 3 |
| Potential Classrooms | 1 |
| **Teaching Spaces Subtotal** | 26 |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) | |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT ) | |
| Restroom/Service | |
| Child Care ( ATB, P&R, B&G ) | 4 |

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

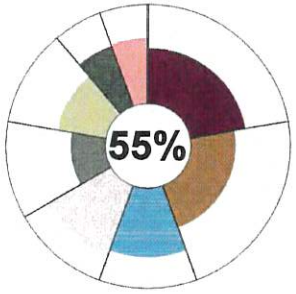
# 6.5 R.L. STEVENSON ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Have a clear and consistent vision
3. Improve fields and grounds
4. Consider outdoor learning environments
5. Provide more spaces for music and art

## Educational Adequacy Scores

- Classroom
- Safety & Security
- Presence
- Assembly
- Extended Learning
- Organization
- Community
- Environmental Quality




## Site Request Needs

**Grounds**
- lack of shade on kindergarten play area
- office layout creates no buffer for safety, no camera system, fence on California Street
- not enough staff parking

**Buildings**
- bad AC in kitchen, update lighting in auditorium

**Programs**
- Ideally SPED would have more than one classroom

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.
- **Main Building:**
  - Reconfigure vacant for OP/PT
  - Reconfigure classroom 31 to wellness
  - Build new building for maker space/ music/art
  - Upgrade lighting in Auditorium
  - Add HVAC in kitchen
- **Site:**
  - Build 500sf entry vestibule in front office
  - Upgrade fencing
  - Expand parking
  - Create bus drop off at parking
  - Build new shade structure
  - The covered walkway had deteriorated wooden components, and the metal components had minor corrosion.
  - The roof covering on the walkway had moderate deterioration throughout.
- Not enough shade.
- **Bungalows:**
  - Modernize and relocate 5 bungalows

# 7.1 THEODORE ROOSEVELT ELEMENTARY SCHOOL



School Entry


Building 1


Building 1


Building 5


Building 6


Building 7

# 7.2 THEODORE ROOSEVELT ELEMENTARY SCHOOL



Classroom


Auditorium


Cafeteria


Staff Office


Library



Auditorium

# 7.3 THEODORE ROOSEVELT ELEMENTARY SCHOOL

## FACILITY

| | |
|---|---|
| Address | 850 N Cordova St,<br>Burbank, CA 91505 |
| Year Constructed | 1935 BLDG 1<br>1941 Classroom 23<br>1945 BLDG 7<br>1953 BLDG 8<br>1968 BLDG 2<br>2016 BLDG 6<br>2019 BLDG 5 |
| Acreage | 5.4 ac |
| Estimated Capacity | 656 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 9 | 57,360 sf |
| Permanent | 6 | 53,863 sf |
| Portable | 3 | 3,497 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK-5 |
| Special Programs | PBIS, Social/Emotional Learning, GATE, Second Step, CLC |




Source: *GOOGLE MAPS 2022*

# 7.4 THEODORE ROOSEVELT ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| TK | 1 |
| Kinder | 4 |
| Grades 1 - 3 | 12 |
| Grades 4 - 5 | 6 |
| Special Ed | 4 |
| Potential Classrooms | 0 |
| **Teaching Spaces Subtotal** | 27 |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) | |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT) | |
| Child Care (ATB, P&R, B&G) | 2 |

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

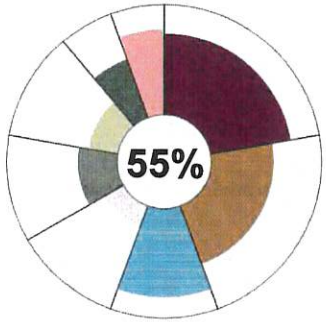
# 7.5 THEODORE ROOSEVELT ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Have a clear and consistent vision
3. Provide more spaces for music and art
4. Improve fields and grounds
5. Enhance before and after school programming

## Educational Adequacy Scores

- Classroom
- Safety & Security
- Presence
- Assembly
- Extended Learning
- Organization
- Community
- Environmental Quality




## Site Request Needs

**Grounds**
- More green space and less asphalt, re-asphalt at teddy bear park for ADA accessibility
- Make a forced security check through front office, only secure once in the building

**Buildings**
- Auditorium does not have AC and chairs are broken, plumbing has leaks and clogs, rain causes water damage at windows

**Programs**
- No dedicated art space, no MPR or open space for meetings/ community

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.
- **Program**:
  - Reconfigure 1 room to de-escalation room and meeting room
  - Reconfigure computer lab to STEAM
  - Reconfigure music room to add art space
- **Site:**
  - Add green space
  - Reconfigure entrance with 500sf security vestibule
  - The roof covering on the covered walkway was severely deteriorated; not enough green outdoor space; The asphalt at teddy bear park is not ADA compliant.
- **Bungalows**:
  - Remove 2 bungalows

# 8.1 THOMAS EDISON ELEMENTARY SCHOOL



School Entry


Courtyard


Hallway


Main Building


Childcare Center


Portable Building

# 8.2 THOMAS EDISON ELEMENTARY SCHOOL



Staff Office



Hallway


Staff Office


Staff Break Room


Library


Auditorium

# 8.3 THOMAS EDISON ELEMENTARY SCHOOL

## FACILITY

| | |
|---|---|
| Address | 2110 W Chestnut St, Burbank, CA 91506 |
| Year Constructed | 1947 BLDG 5<br>1947 Portables A-D<br>1950 BLDG 1<br>1950 BLDG 2<br>1952 BLDG 8<br>1952 BLDG 10<br>1952 BLDG 6<br>1954 BLDG 12<br>1961 BLDG 3<br>1961 BLDG 4<br>1998 BLDG 11<br>2019 BLDG 13 |
| Acreage | 6.6 ac |
| Estimated Capacity | 519 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 7 | 46,121 sf |
| Permanent | 2 | 41,161 sf |
| Portable | 5 | 4,960 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK - 5 |
| Special Programs | ELD, GATE, Special Education programs, Outdoor Science School for 5th graders, an arts wheel with a variety of of art genres, after school enrichment opportunities RSP |




Source: *GOOGLE MAPS 2022*

# 8.4 THOMAS EDISON ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| TK | 1 |
| Kinder | 2 |
| Grades 1 - 3 | 9 |
| Grades 4 - 5 | 6 |
| Special Ed | 1 |
| Potential Classrooms | 1 |
| **Teaching Spaces Subtotal** | 20 |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) | |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, SAI) | |
| Child Care ( ATB, P&R, B&G ) | 2 |

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

02 SITE PROFILES

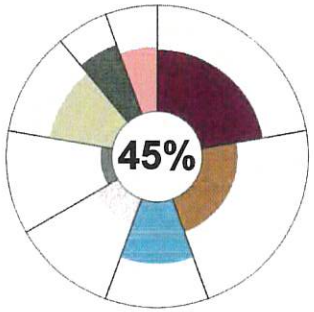
# 8.5 THOMAS EDISON ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Have a clear and consistent vision
3. Provide more spaces for music and art
4. Enhance before and after school programming
5. Improve fields and grounds

## Educational Adequacy Scores

- Classroom
- Safety & Security
- Presence
- Assembly
- Extended Learning
- Organization
- Community
- Environmental Quality




## Site Request Needs

**Grounds**
- Create single entry point at front of school

**Buildings**
- Repave blacktop, holes in the rubber surface on playground, relocated outdoor facilities closer to the field
- Bungalows relocate closer to main building

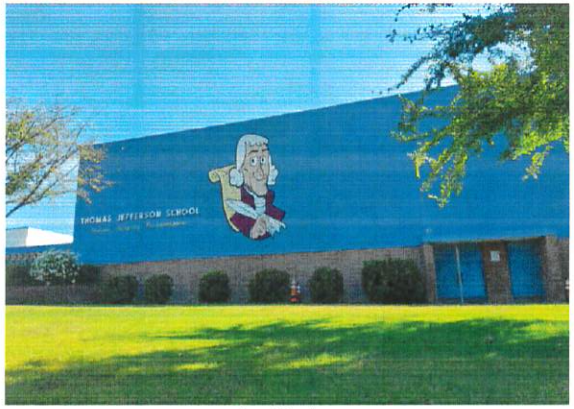
**Programs**
- Create project-based learning space, create STEM lab based on the Disney STEM lab model

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.

- **Site:**
  - Facility staff reported issues: barrel wash clogged, parking lot needs repair, holes in playground rubber surface, and distant outdoor facilities from the field.
  - Build new 1600sf lunch shelter
- **Main Building:**
  - Reconfigure entrance with new 500sf entry vestibule
  - Build new shade structure
- **Bungalows:**
  - Modernize 3 bungalows
  - Remove bungalows

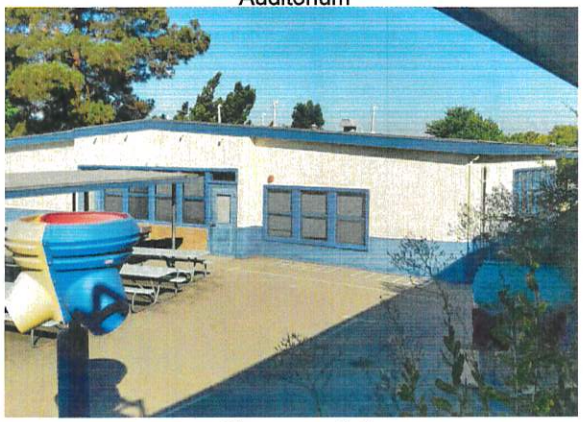
# 9.1 THOMAS JEFFERSON ELEMENTARY SCHOOL



Auditorium


Site


Library


Classroom 1-2


Classroom 9-15


Classroom 16-21

# 9.2 THOMAS JEFFERSON ELEMENTARY SCHOOL

## FACILITY

| | |
|---|---|
| Address | 1900 N. Sixth Street , Burbank, CA 91504 |
| Year Constructed | 1940 BLDG 1<br>1941 Portable 25<br>1968 BLDG 2<br>1968 Portable 24<br>1989 Portable 1<br>1999 Portable 30<br>1999 Portable 31 |
| Acreage | 7.11 |
| Estimated Capacity | 774 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 17 | 57,988 sf |
| Permanent | 14 | 55,108 sf |
| Portable | 3 | 2,880 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | K - 5 |
| Special Programs | RTI, RSP, GATE, ELD, |




Source: *GOOGLE MAPS 2022*

02 SITE PROFILES

# 9.3 THOMAS JEFFERSON ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| TK | 1 |
| Kinder | 5 |
| Grades 1 - 3 | 15 |
| Grades 4 - 5 | 8 |
| Special Ed | 1 |
| Potential Classrooms | 0 |
| **Teaching Spaces Subtotal** | 30 |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces ) | |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT ) | |
| Restroom/Service | |
| Child Care ( ATB, P&R, B&G ) | 5 |

LEGEND

| | |
|---|---|
| | CAMPUS ENTRY |
| | PERMANENT ROOM |
| | PORTABLE ROOM |
| RR | RESTROOMS |
| | PLAY STRUCTURES |

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

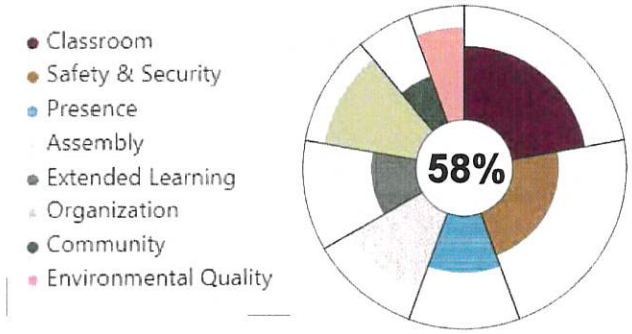
02 SITE PROFILES

# 9.4 THOMAS JEFFERSON ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Have a clear and consistent vision
3. Address the needs of students of all abilities
4. Provide more spaces for music and art
5. Enhance before and after school programming

## Educational Adequacy Scores




## Site Request Needs

**Grounds**
- Create single entry point at front of school

**Buildings**
- Repave blacktop, holes in the rubber surface on playground, relocated outdoor facilities closer to the field
- Bungalows relocate closer to main building

**Programs**
- Create project-based learning space, create STEAM lab based on the Disney STEAM lab model

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.

- **Building**:
  - General maintenance everywhere
    - Build new 1600sf lunch shelter
    - Roofs
    - Plumbing
  - Build new building for music/art/maker space
  - Reconfigure classroom to office
  - Reconfigure music room to wellness center
- **Site**:
  - Add shade, outdoor furniture
  - Re-route pickup and drop off
  - Build new 1600sf lunch shelter with sprinklers
  - Facility issues include deteriorated covered walkway (roof, wooden components, downspouts), a weather-exposed lunch shelter, challenging garden upkeep, dirty kindergarten play space, and lack of ADA accessibility for the building.
  - Improve ADA access at Karen Street
  - Build new outdoor classroom
- **Bungalows**
  - Remove 2 bungalows
  - Modernize 1 bungalow

# 10.1 WALT DISNEY ELEMENTARY SCHOOL




School Entry



Lunch Shelter




Classroom 4-5



Classroom 6-7



Basketball Court



Cafeteria

# 10.2 WALT DISNEY ELEMENTARY SCHOOL



Library




Admin



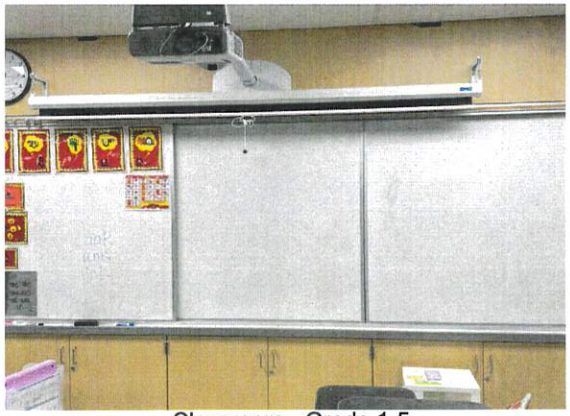
Classroom - Grade 1-5



Classroom - Pre K



Library



Classroom - Grade 1-5

# 10.3 WALT DISNEY ELEMENTARY SCHOOL

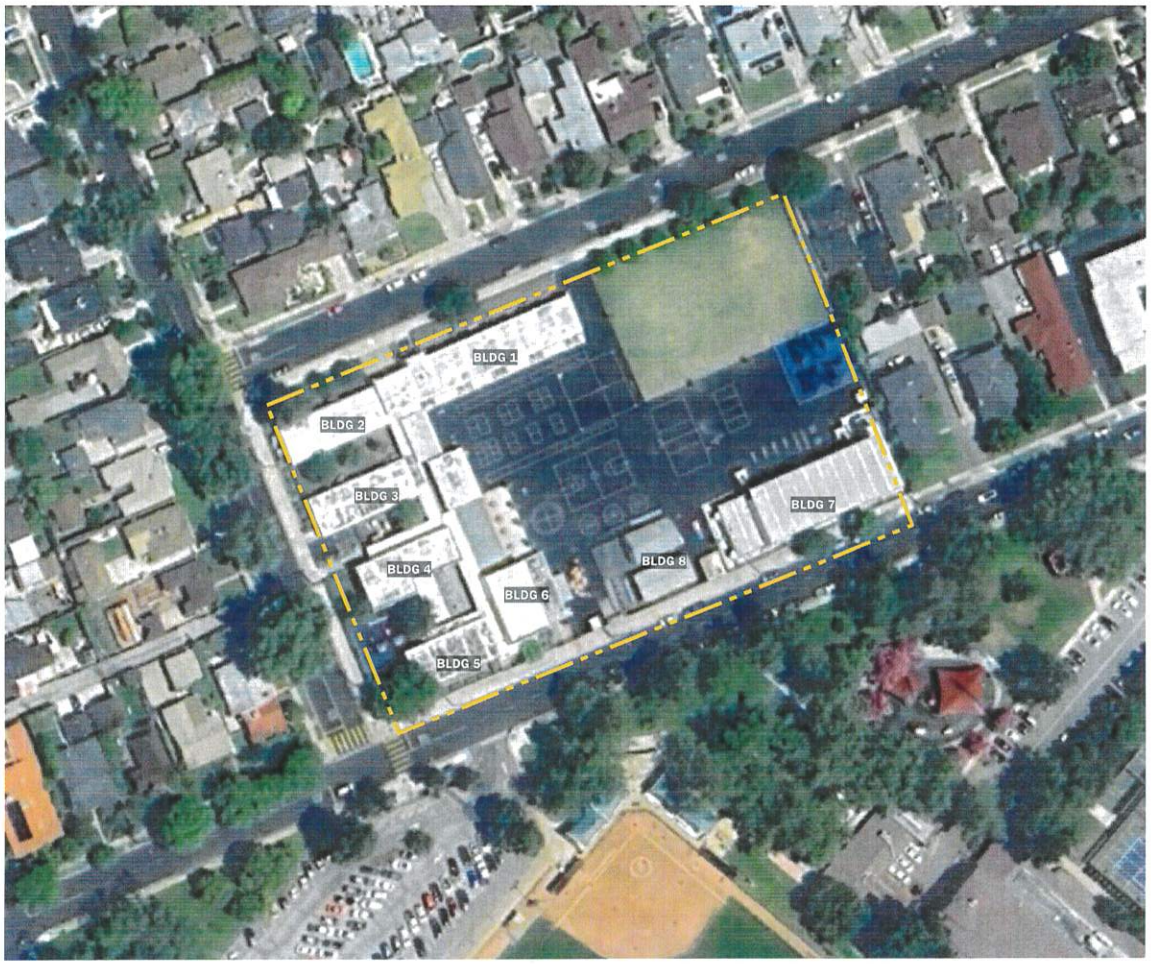
## FACILITY

| | |
|---|---|
| Address | 1220 W Orange Grove Ave, Burbank, CA 91506 |
| Year Constructed | 1946 BLDG 5<br>1946 BLDG 3<br>1946 Portable 25<br>1949 BLDG 1<br>1949 BLDG 4<br>1949 BLDG 2<br>1989 Music<br>1954 Library<br>1954 BLDG 6<br>1954 BLDG 7 |
| Acreage | 2.7 ac |
| Estimated Capacity | 494 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 10 | 31,416 sf |
| Permanent | 8 | 28,376 sf |
| Portable | 2 | 3,040 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK-5 |
| Special Programs | RSP, ELD, DI, RTI, GATE |




Source: *GOOGLE MAPS 2022*

# 10.4 WALT DISNEY ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| TK | 0 |
| Kinder | 3 |
| Grades 1 - 3 | 11 |
| Grades 4 - 5 | 6 |
| Special Ed | 1 |
| Potential Classrooms | 0 |
| **Teaching Spaces Subtotal** | 23 |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) | |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT ) | |
| Child Care ( ATB, P&R, B&G ) | 1 |

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#



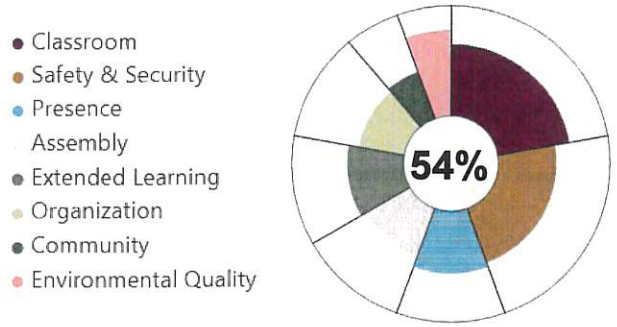

Source: *GOOGLE MAPS 2022*

# 10.5 WALT DISNEY ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Improve educational technology
2. Provide more spaces for music and art
3. Address the needs of students of all abilities
4. Have a clear and consistent vision
5. Provide equitable improvements across all schools

## Educational Adequacy Scores




## Site Request Needs

**Grounds**
- No parking at the school, must park on surrounding streets or lot across the street, difficult time with drop off and pick up

**Buildings**
- Have a better space than what the bungalows provide Concerned about missed opportunities to attract families to school

**Programs**
- No SPED classrooms, need more space for TK and dual immersion, would like a dance studio and dedicated wellness space, create a program for mental health

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.
- **Site:**
  - Covered walkway displayed deteriorated wooden and corroded metal components.
  - District maintenance staff noted that domestic water piping and sanitary sewer piping throughout the campus exceeded their anticipated useful life, possibly leading to accelerated deterioration and structural concerns due to evidence of ponding near building foundations.
  - Build new 1600sf lunch shelter with service
  - speed line
- **Building**:
  - Building components and systems observed nearing or surpassing their anticipated lifespans include the air curtain, exterior windows, kitchen water heater, gutters, downspouts, roof, rooftop package unit, switchgear, and exterior doors.
- **Program:**
  - Expand admin to 2,000 SF space with security entry vestibule and reconfigure
  - Reconfigure classrooms:
    - 1 to music/art
    - 1 dual immersion
    - 1 TK
  - Build new building for music,TK and library
- **Bungalows:**
  - Remove 1 bungalow

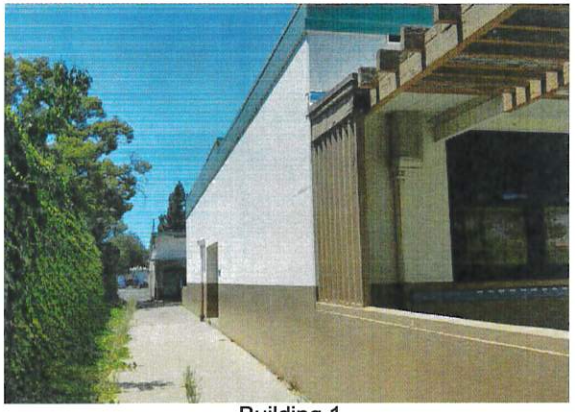
# 11.1 WILLIAM MCKINLEY ELEMENTARY SCHOOL



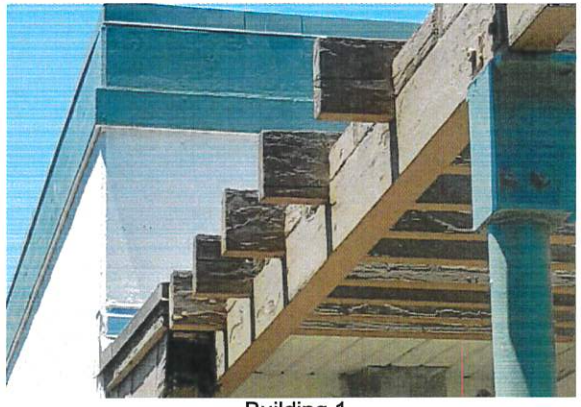
School Entry


Building 1

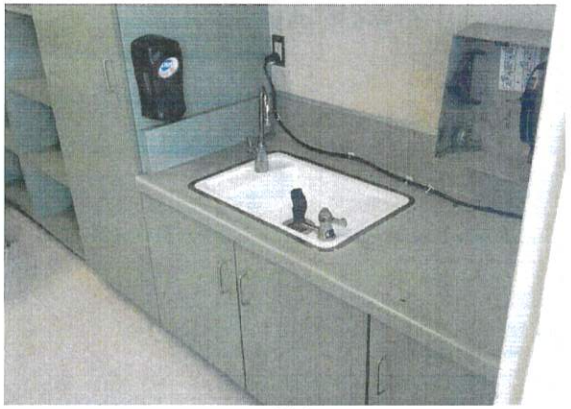

Building 1


Building 1


Portable Building


Building 1

# 11.2 WILLIAM MCKINLEY ELEMENTARY SCHOOL



Sink



Hallway



Classroom - Grade 1-5



Classroom - Grade 1-5



Classroom - Grade 1-5



Library

# 11.3 WILLIAM MCKINLEY ELEMENTARY SCHOOL

## FACILITY

| | |
|---|---|
| Address | 349 W Valencia Ave, Burbank,CA 91506 |
| Year Constructed | 1935 BLDG 1<br>1935 BLDG Music<br>1950 BLDG 2<br>1950 BLDG 3<br>1998 Portable 40<br>2019 Portable 41<br>2019 Portable 42 |
| Acreage | 5 ac |
| Estimated Capacity | 546 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 10 | 52,220 sf |
| Permanent | 3 | 45,445 sf |
| Portable | 7 | 6,775 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK-5 |
| Special Programs | ELD, GATE, RTI, APE, RSP |




Source: *GOOGLE MAPS 2022*

# 11.4 WILLIAM MCKINLEY ELEMENTARY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| TK | 1 |
| Kinder | 3 |
| Grades 1 - 3 | 9 |
| Grades 4 - 5 | 6 |
| Special Ed | 3 |
| Potential Classrooms | 6 |
| **Teaching Spaces Subtotal** | 28 |

## NON-LOADED SPACES

| | |
|---|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) | |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT) | |
| Child Care (ATB, P&R, B&G) | 2 |

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

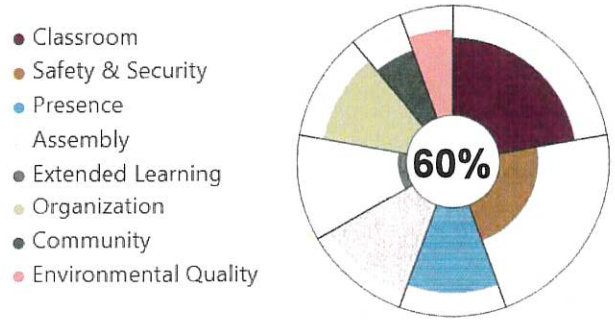
02 SITE PROFILES

# 11.5 WILLIAM MCKINLEY ELEMENTARY SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Improve educational technology
3. Have a clear and consistent vision
4. Address the needs of students of all abilities
5. Provide equitable improvements across all schools

## Educational Adequacy Scores




## Site Request Needs

**Grounds**

- Drainage problems in parking lot, playground has cracks in asphalt
- Some people must park on the street

**Buildings**

- Plumbing and maintenance, tracking system is not kept up with, following through with projects

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.
- **Site:**
  - Use unknown CR for entry vestibule and expand admin,
  - Turn dirt lot into outdoor classroom
  - Expand parking, play field
  - Campus issues included a deteriorated covered walkway, exceeding lifespan of domestic water and sanitary sewer piping, evidence of water pooling near building foundations raising concerns for accelerated deterioration or structural issues, and a lack of parking causing difficulties with pick-up and drop-off.
- **Bungalows:**
  - Remove 4 bungalows
  - Modernize 2 bungalows
  - Reconfigure computer lab to STEAM, wellness center
  - Program:
    - Add OP/PT room
    - Add additional sped program
  - Various building components, including the air curtain, exterior windows, kitchen water heater, gutters, downspouts, roof, rooftop package unit, switchgear, and exterior doors, were observed either approaching or surpassing their anticipated lifespans.

# 12.1 DOLORES HUERTA MIDDLE SCHOOL



School Entry



Courtyard



Building 7



Building 7



Auditorium



Auditorium

# 12.2 DOLORES HUERTA MIDDLE SCHOOL



Gym



Cafeteria



Staff Break Room



Classroom - Grade 6-8



Cafeteria



Library

# 12.3 DOLORES HUERTA MIDDLE SCHOOL

## FACILITY

| | |
|---|---|
| Address | 420 S Mariposa St, Burbank, CA 91506 |
| Year Constructed | 1947 BLDG 1<br>1947 BLDG 2<br>1947 BLDG 3<br>1947 BLDG 4<br>1947 BLDG 7<br>1949 BLDG 8<br>1949 BLDG 9<br>1954 BLDG 10<br>1955 BLDG 11<br>1999 Portable 610<br>1999 Portable 611 |
| Acreage | 13.75 |
| Estimated Capacity | 2,294 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 11 | 117,127 sf |
| Permanent | 9 | 115,207 sf |
| Portable | 2 | 1,920 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | 6-8 |
| Special Programs | Dual immersion, SpEd, ELD, ELAC, |




Source: *GOOGLE MAPS 2022*

# 12.4 DOLORES HUERTA MIDDLE SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| General Education Classroom | 43 |
| Special Ed | 6 |
| Potential Classrooms | 4 |
| **Teaching Spaces Subtotal** | 53 |

## NON-LOADED SPACES

- Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT )
- Service




LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#

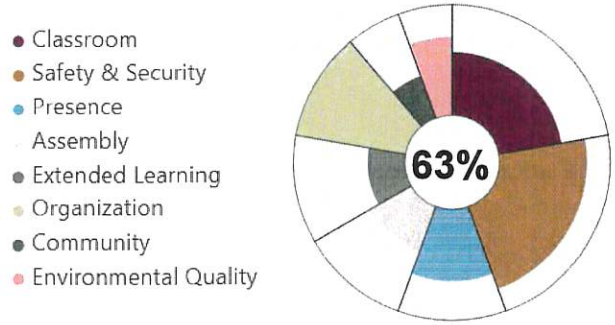
Source: *GOOGLE MAPS 2022*

# 12.5 DOLORES HUERTA MIDDLE SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Provide equitable improvements across all schools
3. Have a clear and consistent vision
4. Improve educational technology
5. Include all voices and stakeholders

## Educational Adequacy Scores




## Site Request Needs

**Grounds**

- campus access is too easy, more cameras needed
- Limited outdoor covered space, would like more sustainable "green" spaces that are desert friendly and don't need irrigation, walkways have broken concrete, posts have rusted through

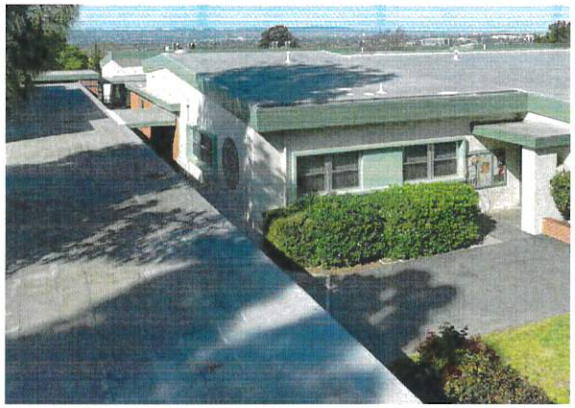
**Buildings**

- leaking roofs, broken toilets, room 101 has black mold and water damage, HVAC is not reliable across campus
- more gender neutral needed, showers to changing spaces? Community access to gym and cafeteria is awkward – walking through a field to reach building

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.
- **Program**:
  - Reconfigure 2000 sqft for STEAM space
  - Reconfigure cafe for music and drama
- **Building:**
  - Remove 2 bungalows
  - Restroom upgrades - individual and gender neutral
  - Replace roofs
- **Site:**
  - Build new lunch shelter 2400 sqft

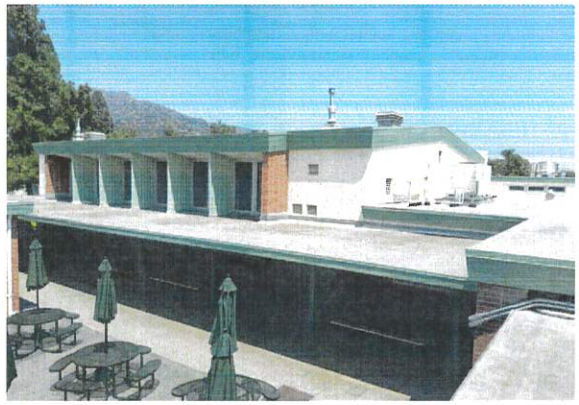
# 13.1 JOHN MUIR MIDDLE SCHOOL



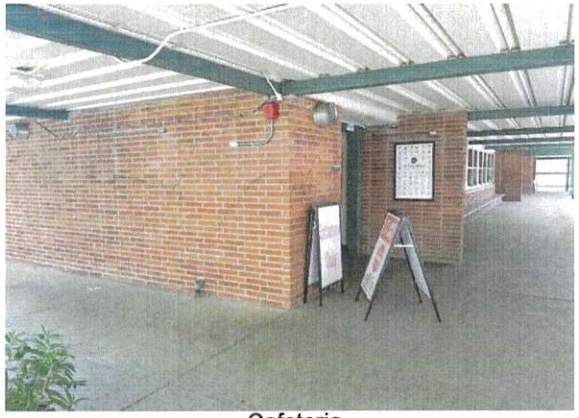
Classroom



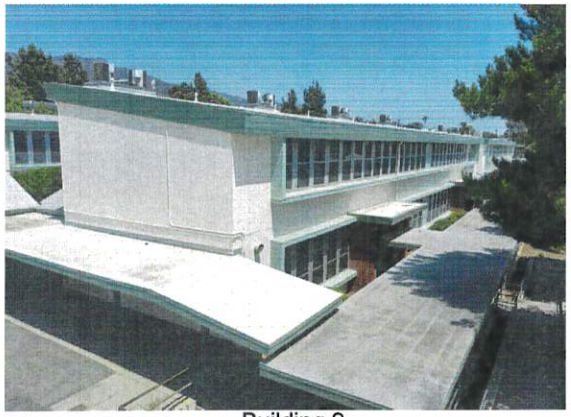
Classroom



Cafeteria



Cafeteria



Building 9

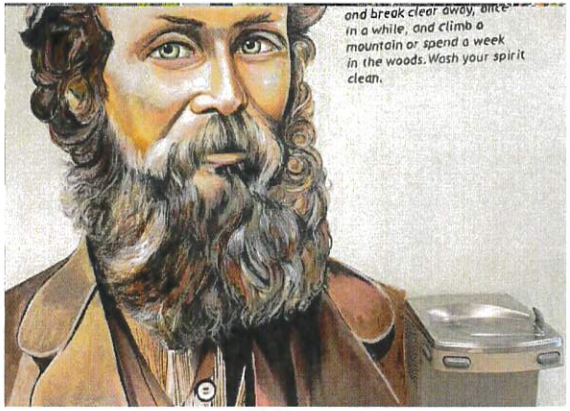


Building 9

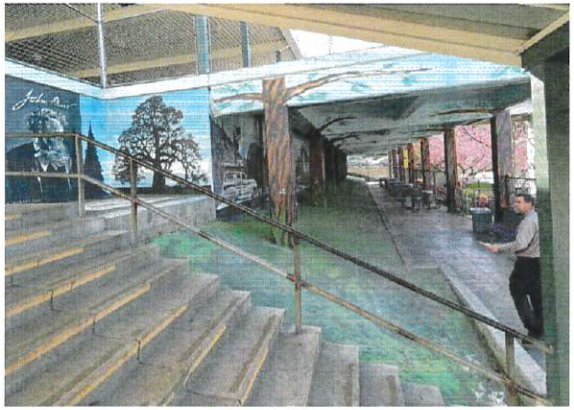
# 13.2 JOHN MUIR MIDDLE SCHOOL



Hallway




Hallway



Lunch Shelter



Hallway



Classroom



Auditorium

# 13.3 JOHN MUIR MIDDLE SCHOOL

## FACILITY

| | |
|---|---|
| Address | 1111 N Kenneth Rd,<br>Burbank, CA 91504 |
| Year Constructed | 1951 BLDG 1<br>1951 BLDG 7<br>1951 BLDG 8<br>1951 BLDG 3<br>1951 BLDG 2<br>1951 BLDG 6<br>1952 BLDG 4<br>1954 BLDG 9<br>1967 BLDG 5 |
| Acreage | 14.34 ac |
| Estimated Capacity | 1,982 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 14 | 141,679 sf |
| Permanent | 10 | 137,839 sf |
| Portable | 4 | 3,840 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | 6-8 |
| Special Programs | ELD, DHH, TOSA, SpEd, RTI, FSA |




Source: *GOOGLE MAPS 2022*

02 SITE PROFILES

# 13.4 JOHN MUIR MIDDLE SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| General Education Classroom | 57 |
| Special Ed | 2 |
| **Teaching Spaces Subtotal** | 59 |

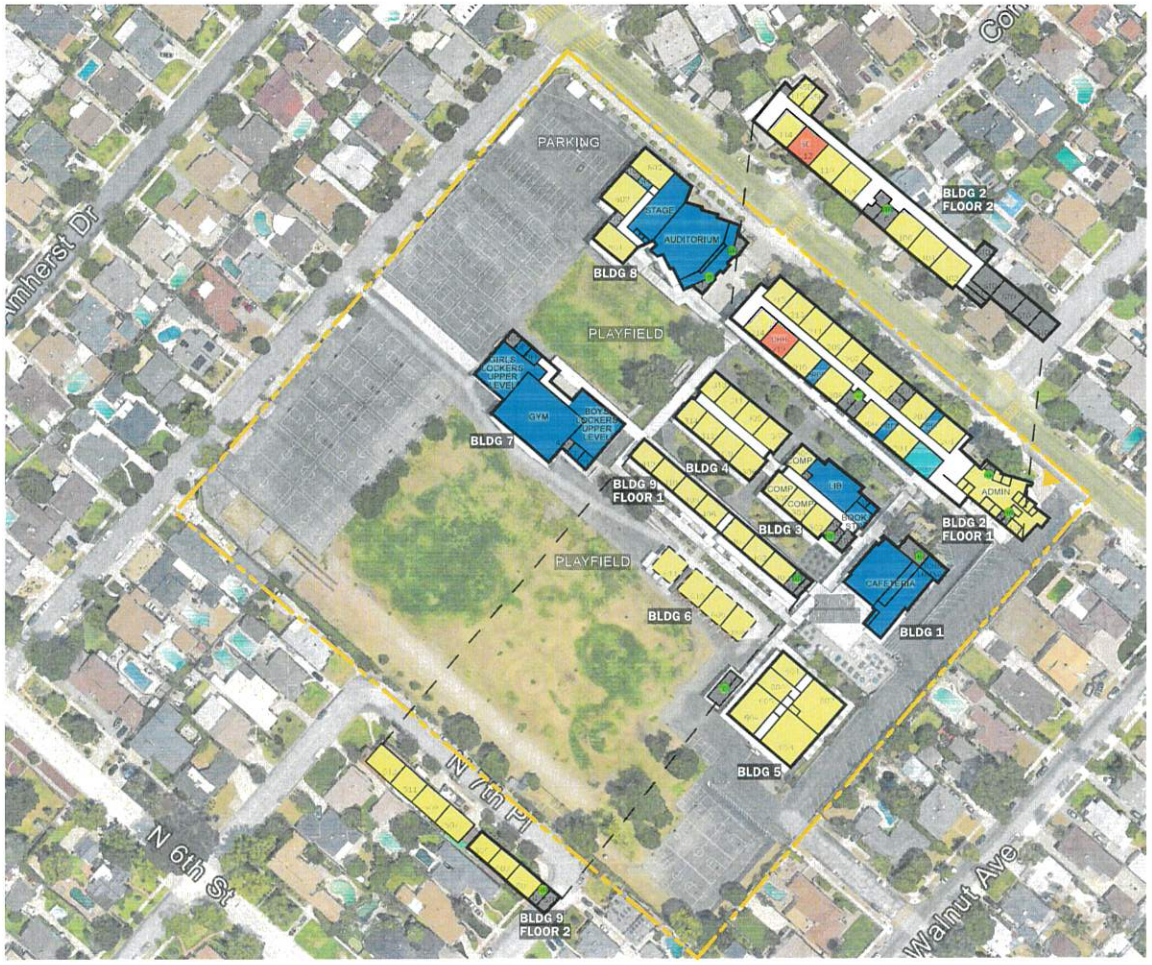
## NON-LOADED SPACES

- Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT)
- Service

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#



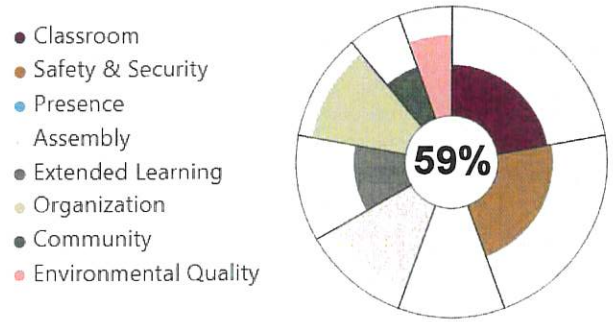

Source: *GOOGLE MAPS 2022*

# 13.5 JOHN MUIR MIDDLE SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Have a clear and consistent vision
3. Address the needs of students of all abilities
4. Enhance before and after school programming
5. Improve educational technology

## Educational Adequacy Scores




## Site Request Needs

**Grounds**

- Drainage problems in parking lot, playground has cracks in asphalt
- Some people must park on the street

**Buildings**

- Plumbing and maintenance, tracking system is not kept up with, following through with projects

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.
- **Site:**
  - Maintenance issues include problematic galvanized irrigation piping, deteriorated roof covering on walkway canopies, drainage problems near the administration area, flooring issues due to the removal of a tree near the outdoor dining area, and erosion leaving the track and field down to dirt and rock.
  - Resurface track
- **Building**:
  - Building and facility items exceeding or nearing their anticipated useful life include the locker room, drinking fountains, rooftop exhaust fans, rooftop package units, roof covering, kitchen sink in the teachers' lounge, multi-occupant restrooms, fan coil units, condensing units using R22 refrigerant, panel boards, and switch gear.
  - Remove 4 bungalows
  - Build new building for 4 science labs
  - Reconfigure 2 computer labs for 1 maker space
  - Reconfigure 2 classrooms for wellness center and office extension
  - Reconfigure admin
  - Reconfigure 2 classrooms for teachers lounge/workroom
  - Reconfigure bathrooms for single use and gender neutral

# 14.1 LUTHER BURBANK MIDDLE SCHOOL



School Entry



Hallway



Courtyard




Cafeteria



Classroom 100s




Classroom 200s

# 14.2 LUTHER BURBANK MIDDLE SCHOOL



Auditorium



Gym



Staff Break Room



Classroom - Grade 6-8



Cafeteria



Auditorium

# 14.3 LUTHER BURBANK MIDDLE SCHOOL

## FACILITY

| | |
|---|---|
| Address | 3700 West Jefferies Ave, Burbank, CA 91505 |
| Year Constructed | 1935 BLDG 1<br>1937 BLDG 8<br>1947 BLDG 2<br>1947 BLDG 3<br>1947 BLDG 4<br>1947 BLDG 6<br>1947 BLDG 7<br>1947 BLDG 11<br>1947 Site<br>1948 BLDG 10<br>1949 BLDG 5<br>1949 BLDG 9<br>2008 Portable CDC ofice<br>2008 Portable Classroom 1<br>2008 Portable Classroom 2 |
| Acreage | 22.04 ac |
| Estimated Capacity | 1,988 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 11 | 122,941sf |
| Permanent | 11 | 122,941sf |
| Portable | 0 | 0 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | 6-8 |
| Special Programs | ASB, VMA, CJSF, Culinary Arts, RTI, FSA, ELD, |




Source: *GOOGLE MAPS 2022*

# 14.4 LUTHER BURBANK MIDDLE SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

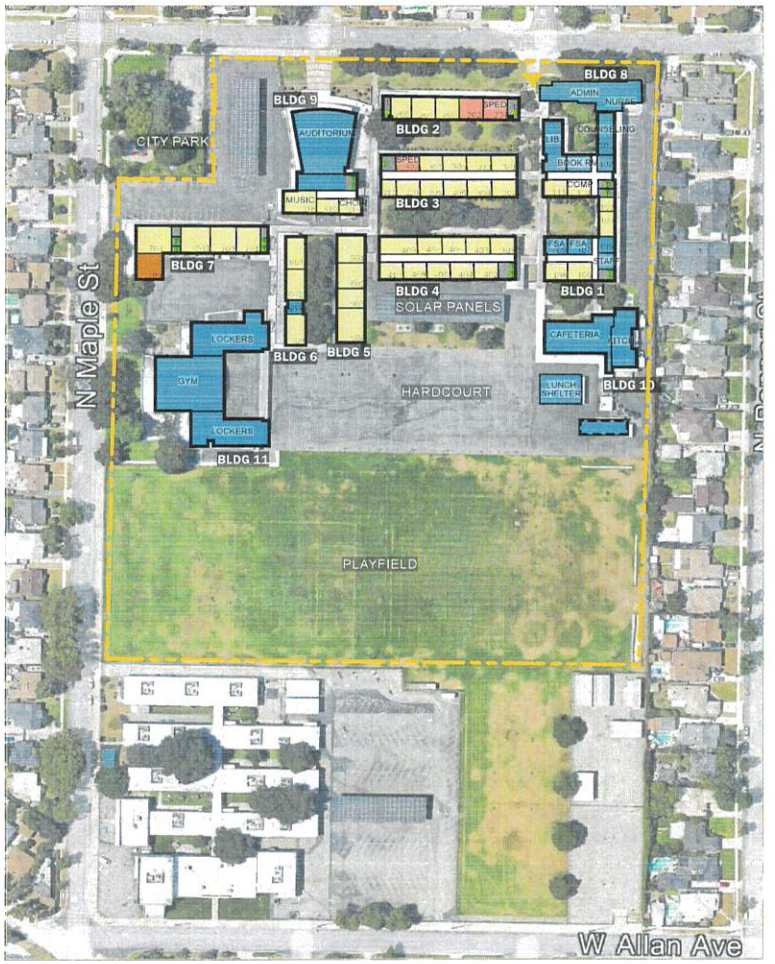
| Space Designation | Rooms |
|---|---|
| General Education Classroom | 43 |
| Special Ed | 3 |
| **Teaching Spaces Subtotal** | 46 |

## NON-LOADED SPACES

| | |
|---|---|
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT) | |
| Service | |
| Child Care (ATB, P&R, B&G) | 1 |

LEGEND

| | |
|---|---|
| | CAMPUS ENTRY |
| | PERMANENT ROOM |
| | PORTABLE ROOM |
| RR | RESTROOMS |
| | PLAY STRUCTURES |
| | X: GRADE# Y: ROOM# |




Source: *GOOGLE MAPS 2022*

02 SITE PROFILES

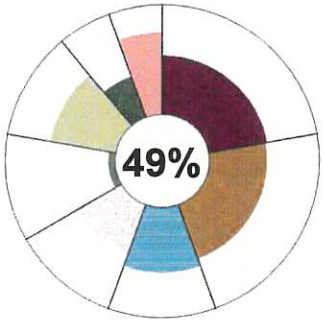
# 14.5 LUTHER BURBANK MIDDLE SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Have a clear and consistent vision
3. Improve educational technology
4. Include all voices and stakeholders
5. Provide equitable improvements across all schools

## Educational Adequacy Scores

- Classroom
- Safety & Security
- Presence
- Assembly
- Extended Learning
- Organization
- Community
- Environmental Quality




## Site Request Needs

**Grounds**
- rain day scenarios for gym classes and for lunches shade not adequate for rain cover, more flexible space
- classrooms lockable from the outside, only one access to field and basketball court
- New water fountains

**Buildings**
- roof leaks, outdated, old technology, not enough outlets

**Program**
- Increase Gym space - only 1 gym but 4 gym teachers so 3 classes have to go outside

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.
- **Site:**
  - Issues observed involve the roof covering for walkway canopies showing seal coat deterioration, evidence of past repairs, and small areas of corrosion underneath, along with problematic galvanized irrigation piping near the auditorium reported by facility maintenance staff
  - Build new 2400 sqft lunch shelter
  - Add shade
  - Add security cameras
- **Building**:
  - Issues observed included deteriorated seal coat on the roof covering, with approaching end of its expected useful life, along with single occupant restrooms and water heaters exceeding their anticipated useful life spans. No reported leaks despite the deteriorated seal coat on the roof covering.
  - Add water to all science rooms
  - Add outlets
  - Upgrade furniture
  - Add tacklable and writable walls in rooms
  - New water fountains
  - Expand gym security
  - Modernization the entire school
  - Add outdoor classroom modernize whole school
  - Convert room to dance
  - Convert room to training area
  - Reconfigure 3 classroom for 2 science rooms
  - Reconfigure building 5 for all science rooms
  - Reconfigure 2 classroom for dance
  - Reconfigure bathrooms for single use and gender neutral

# 15.1 BURBANK HIGH SCHOOL



School Entry




School Entry



Building Entry



Cafeteria



Cafeteria

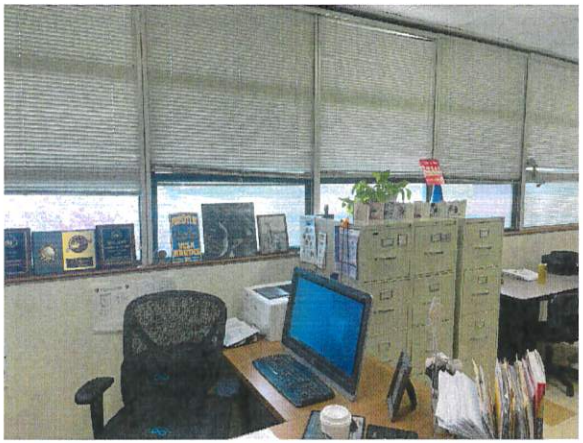


Building 1

# 15.2 BURBANK HIGH SCHOOL



Hallway



Staff Office



Classroom - Grade 9-12



Classroom



Shop



Library

# 15.3 BURBANK HIGH SCHOOL

## FACILITY

| | |
|---|---|
| Address | 902 North Third Street, Burbank, CA 91502 |
| Year Constructed | 2002 BLDG 1<br>2002 BLDG 2<br>2002 BLDG 3 |
| Acreage | 16.5 ac |
| Estimated Capacity | 3,159 |

| Zoning: Public Facility | Count | Area |
|---|---|---|
| Total | 7 | 346,545 sf |
| Permanent | 7 | 346,545 sf |
| Portable | 0 | 0 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | 9-12 |
| Special Programs | ELD, CTE, SpEd, RSP, SDC, DHH, SH |




Source: *GOOGLE MAPS 2022*

# 15.4 BURBANK HIGH SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| General Education Classroom | 95 |
| Special Ed | 8 |
| Potential classrooms | 3 |
| **Teaching Spaces Subtotal** | 106 |

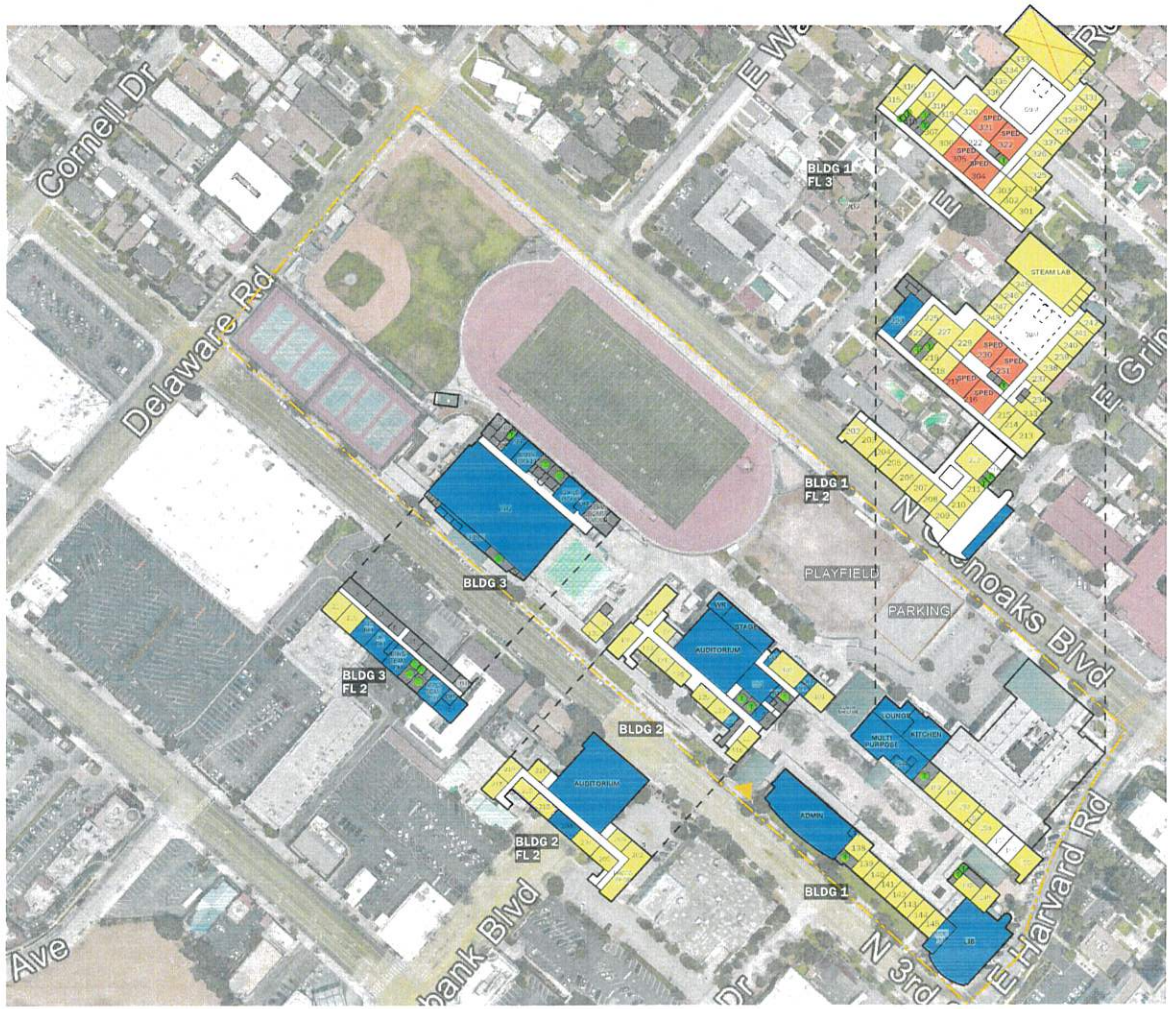
## NON-LOADED SPACES

- Support Spaces
  (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT )
- Restroom/Service

LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RESTROOMS

X: GRADE#
Y: ROOM#




02 SITE PROFILES

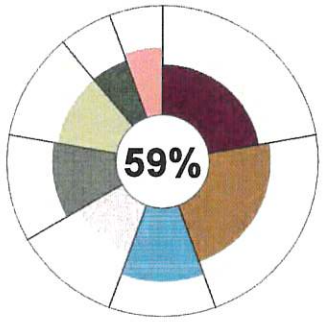
# 15.5 BURBANK HIGH SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Address the needs of students of all abilities
3. Improve educational technology
4. Provide equitable improvements across all schools
5. Include all voices and stakeholders

## Educational Adequacy Scores

- Classroom
- Safety & Security
- Presence
- Assembly
- Extended Learning
- Organization
- Community
- Environmental Quality




## Site Request Needs

**Grounds**
- Too many entry points, easy gate access
- Dirt lot holds potential for something (softball field, more courts overflow parking), baseball field is not a regulation field now
- New water fountains

**Buildings**
- Roof leaks, HVAC temperature and zoning issues

**Program**
- If enrollment grows there will be overcrowding, need to add lines in cafeteria to make lines go faster
- Would like a STEAM room that was half classroom half makers space, no sink in the Art room, need more practice areas

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to Appendix E.

- **Site:**
  - Site drainage issue near the library entrance causing rainwater to drain towards the building, widespread damage observed on the roof covering of walkway canopies, absence of a regulation softball field, and the baseball field not meeting regulatory standards.
  - Build new softball field on dirt lot
- **Building:**
  - Reconfigure and optimize program space
  - Reconfigure bathrooms for single use and gender neutral

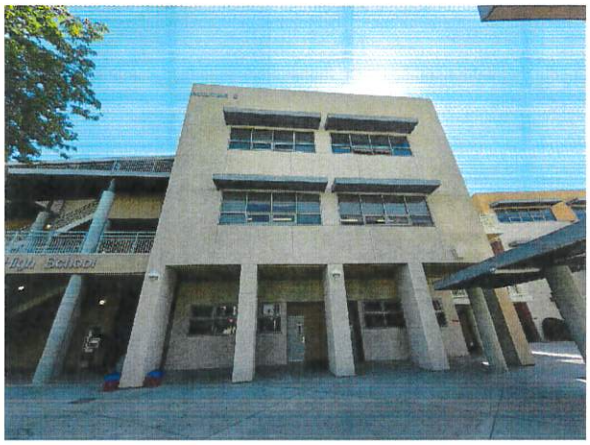
# 16.1 JOHN BURROUGHS HIGH SCHOOL



School Entry



Building 2



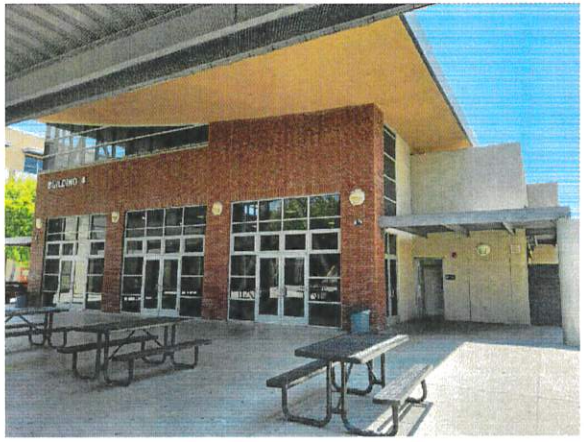
Building 2



Building 3



Building 3



Building 4

# 16.2 JOHN BURROUGHS HIGH SCHOOL



Gym



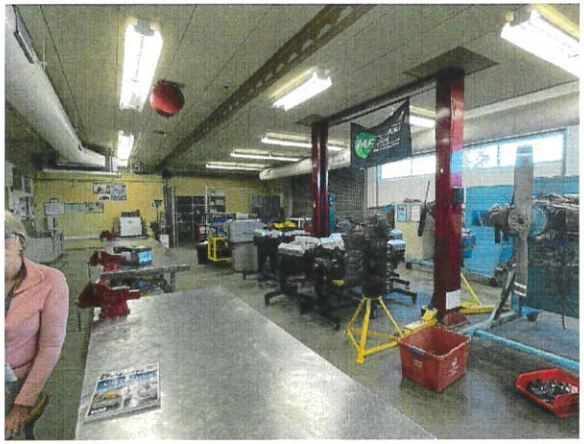
Entry




Lobby



Classroom



Shop



Shop

# 16.3 JOHN BURROUGHS HIGH SCHOOL

## FACILITY

| | |
|---|---|
| Address | 1920 W Clark Ave,<br>Burbank, CA 91506 |
| Year Constructed | 1928 BLDG 1<br>1939 BLDG 3<br>1939 BLDG 6<br>1953 Athletic Field<br>1963 Athletic Field<br>1965 Athletic Field<br>1994 Portables 9101-9106<br>1994 Portable 4117<br>1994 Portable 4118<br>2003 BLDG 2<br>2003 BLDG 5<br>2007 Portables 8101-8107<br>2010 BLDG 4<br>2010 Athletic Field |
| Acreage | 19.54 ac |
| Estimated Capacity | 2,721 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 22 | 259,763 sf |
| Permanent | 7 | 245,843 sf |
| Portable | 8 | 13,920 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | 9-12 |
| Special Programs | ELD, CTE, SpEd, RSP, SDC, DHH, SH |




Source: *GOOGLE MAPS 2022*

# 16.4 JOHN BURROUGHS HIGH SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| General Education Classroom | 82 |
| Special Ed | 15 |
| **Teaching Spaces Subtotal** | 97 |

## NON-LOADED SPACES

| |
|---|
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT ) |
| Restroom/Service |

LEGEND

| |
|---|
| CAMPUS ENTRY |
| PERMANENT ROOM |
| PORTABLE ROOM |
| RESTROOMS |

X: GRADE#
Y: ROOM#

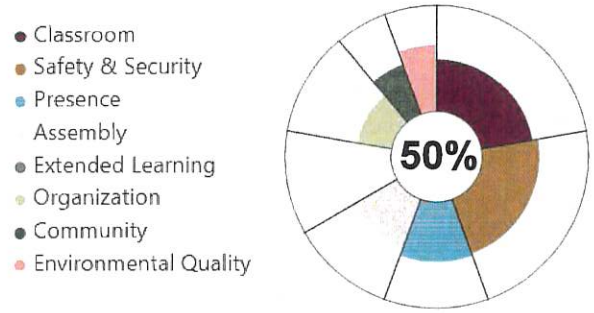


# 16.5 JOHN BURROUGHS HIGH SCHOOL

## School Survey Results -Top 5 Needs

1. Create safer schools
2. Modernize Classrooms
3. Improve Educational Technology
4. Provide More Spaces for Music and Art
5. Address the Needs of Students of All Abilities

## Educational Adequacy Scores




## Sit Request Needs

**Grounds**
- no vestibule and difficult to see who is entering building, no cover outside front door, joint use of campus spaces on weekends

**Buildings**
- Bungalows– bad condition and would like to move world language classes back to main building
- Restrooms – high demand for single occupancy restrooms, converting staff to student but causes mischief, unsafe space due to fights and bullying

## Proposed Potential Projects

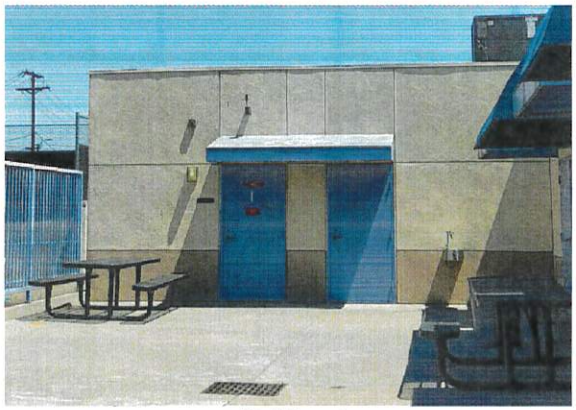
- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to page Appendix E.
- **Site:**
  - Multiple issues identified: Site fencing (north parking lot, between basketball courts and baseball fields) showed widespread corrosion; frequent storm water backup in the quad courtyard during rain events; asphalt paving in the north parking area near the end of its expected life, displaying extensive cracking and weathering; metal walkway canopies had areas with peeling paint and minor corrosion; absence of a softball field.
  - Remove 6 annexed bungalows
  - Add softball field where existing tennis courts are
  - Building new parking structure on current parking lot at W Clark Ave
  - Build tennis courts on top of new parking structure
  - Add new outdoor lighting
  - Security cameras
  - Modernize 2 bungalows on main site
- **Building:**
  - Modernize woodshop
  - Add HVAC to rooms 6102 and 6105
  - Turn ILA site into Professional Development center
  - Reconfigure entry to accommodate 1000sqft security entry vestibule
  - Reconfigure bathrooms for single use and gender neutral
  - Reconfigure and modernize science labs with gas in all
  - Reconfigure life skills and SPED rooms
  - Middle and high reconfiguration

# 17.1 COMMUNITY DAY SCHOOL

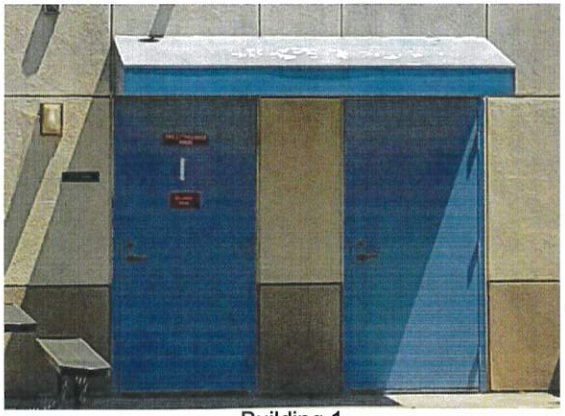


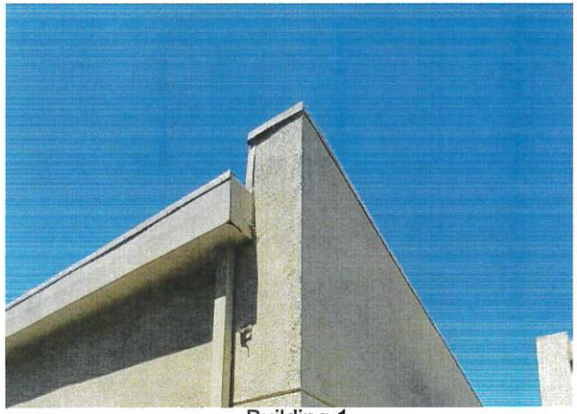
School Entry Gate


Parking Lot

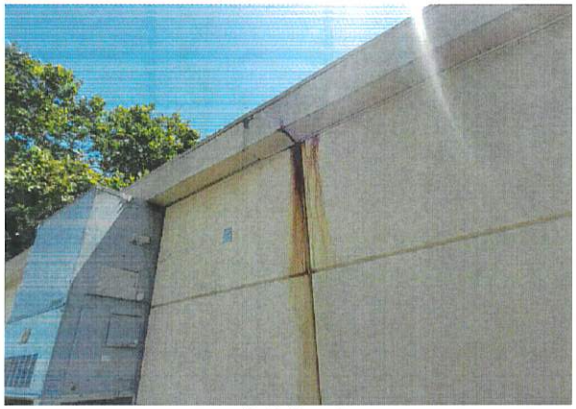

Building 1


Building 1


Building 1


Building 1

# 17.2 COMMUNITY DAY SCHOOL



Building 3




Staff Office



Staff Break Room



Classroom - Grade 9-12



Classroom - Grade 9-12



Staff Office

# 17.3 COMMUNITY DAY SCHOOL

## FACILITY

| | |
|---|---|
| Address | 223 E. Santa Anita,<br>Burbank, CA 91502 |
| Year Constructed | 1995 BLDG 2<br>1995 BLDG 3<br>2020 BLDG 1 |
| Acreage | 1.22 ac |
| Estimated Capacity | |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 3 | 7,960 sf |
| Permanent | 3 | 7,960 sf |
| Portable | 0 | 0 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | 7-12 |
| Special Programs | N/A |




Source: *GOOGLE MAPS 2022*

02 SITE PROFILES

# 17.4 COMMUNITY DAY SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| General Education | 4 |
| **Teaching Spaces Subtotal** | 4 |

## NON-LOADED SPACES

| |
|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Space) |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT ) |
| Restroom/Service |

LEGEND

| | |
|---|---|
| | CAMPUS ENTRY |
| | PERMANENT ROOM |
| | PORTABLE ROOM |
| RR | RESTROOMS |
| | PLAY STRUCTURES |

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

# 17.5 COMMUNITY DAY SCHOOL

## Site Requested Needs

**Grounds**
- cameras are only at entry not around school
- need a second exit, would like and outdoor therapy space, imbed fitness activities into outdoor space, add basketball court, optimize the site opportunities
- currently calling police to address illegal parking would like signs to indicate school zone more clearly

**Buildings**
- Acoustic issues currently being worked on

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to page Appendix E.
- **Building**:
  - Multiple areas showed signs of wear and aging: Faded and worn fabric canopies, deteriorated metal gutters and downspouts, aging single occupant restrooms, panels nearing the end of their expected life, deteriorating exterior windows and doors, some components with minor corrosion, and issues related to the roof due to inaccessibility and assumed deterioration, likely caused by overhanging trees and debris buildup.
  - Full modernization
- **Site:**
  - Upgrade basketball courts
  - Convert dirt lot to play/fitness/outdoor therapy
- **Program:**
  - Build new building for parent meetings, MPR, and wellness center

# 18.1 MONTEREY HIGH SCHOOL



School Entry


Parking Lot


Bike Rack


Building B


Building B


Building B

# 18.2 MONTEREY HIGH SCHOOL



Classroom - Grade 9-12



Staff Office



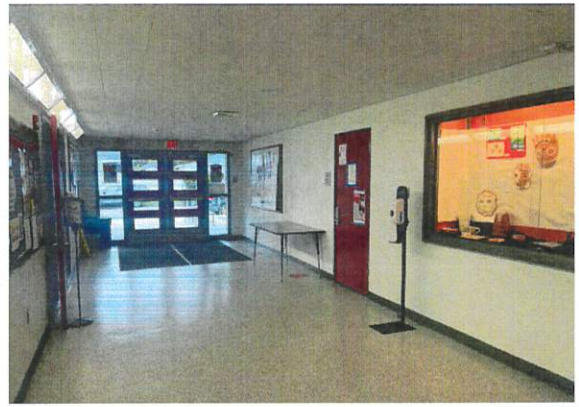

Staff Office



Classroom - Grade 9-12



Cafeteria



Hallway

# 18.3 MONTEREY HIGH SCHOOL

## FACILITY

| | |
|---|---|
| Address | 1915 Monterey Ave, Burbank, CA 91506 |
| Year Constructed | 1948 BLDG A<br>1951 BLDG B<br>1990 BLDG C |
| Acreage | 2.1 ac |
| Estimated Capacity | 374 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 5 | 25,776 sf |
| Permanent | 3 | 23,376 sf |
| Portable | 2 | 2,400 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | 9-12 |
| Special Programs | N/A |




Source: *GOOGLE MAPS 2022*

# 18.4 MONTEREY HIGH SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

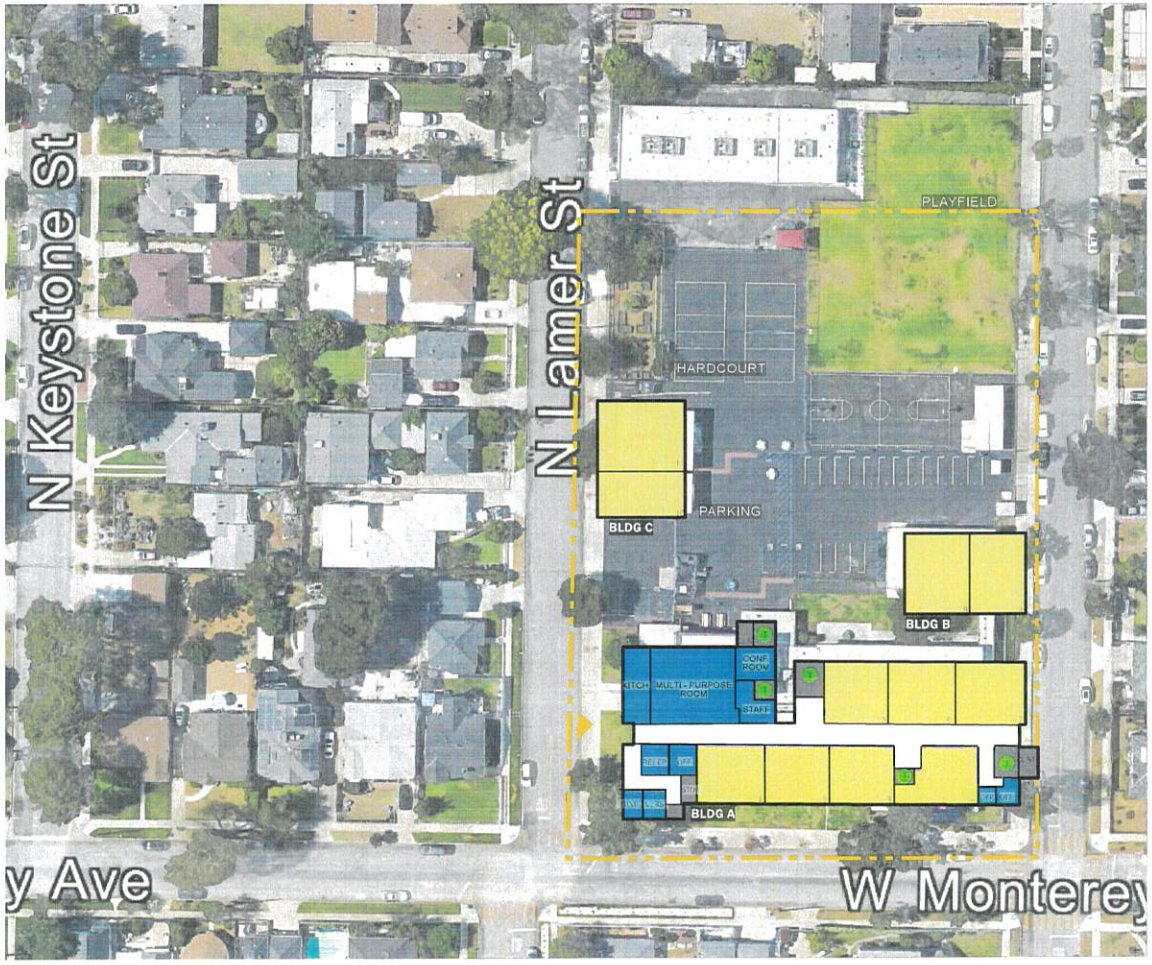
| Space Designation | Rooms |
|---|---|
| General Education Classroom | 11 |
| Special Ed | 0 |
| **Teaching Spaces Subtotal** | 11 |

## NON-LOADED SPACES

| |
|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT) |
| Restroom/Service |

LEGEND

| |
|---|
| CAMPUS ENTRY |
| PERMANENT ROOM |
| PORTABLE ROOM |
| RESTROOMS |
| X: GRADE# Y: ROOM# |




Source: *GOOGLE MAPS 2022*

# 18.5 MONTEREY HIGH SCHOOL

## Site Request Needs

**Grounds**

- Space for teachers for outdoor lunch (Monterey Ave?), field upgrades
- replace existing cameras that do not connect to the computers, more cameras in halls
- convert parking lot to student quad, convert nursery to STEAM space, convert garden to outdoor classroom

**Program**

- Nursery upgrades to STEAM space and flex space, Cafeteria not used as classroom, outdoor garden into a classroom
  Furniture upgrades

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to page Appendix E.
- **Site:**
  - Convert underused parking lot to quad
  - Add shade
  - Convert garden to outdoor classrooms
  - Upgrade field
- **Building**:
  - Several critical building components showed signs of aging and deterioration: The roof covering demonstrated moderate wear with alligator cracking and ponding, alongside aging kitchen hood exhaust, air curtain, mini-split system, water heater, and rooftop package units using R22 refrigerant. Additionally, main distribution switch gear and multiple panel boards were approaching the end of their expected useful life, as the roof remained partly inaccessible and indicated end-of-life signs based on campus conditions.
  - Full Modernization
- **Program:**
  - Reconfigure nursery to STEAM lab
  - Reconfigure 1 classroom for marker space

# 19.1 MAGNOLIA PARK SCHOOL



Classroom


Playground


Building A


Playground


Building C


Building B

02 SITE PROFILES

# 19.2 MAGNOLIA PARK SCHOOL

## FACILITY

| | |
|---|---|
| Address | 1915 W Monterey Ave, Burbank, CA 91506 |
| Year Constructed | 1948 |
| Acreage | 0.6 ac |
| Estimated Capacity | 42 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 1 | 5,720 sf |
| Permanent | 1 | 5,720 sf |
| Portable | 0 | 0 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | 9-12 |
| Special Programs | Foothill SELPA |




Source: *GOOGLE MAPS 2022*

# 19.3 MAGNOLIA PARK SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| General Education Classroom | 0 |
| Special Ed | 3 |
| **Teaching Spaces Subtotal** | 3 |

## NON-LOADED SPACES

| |
|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT ) |
| Restroom/Service |

LEGEND

| |
|---|
| CAMPUS ENTRY |
| PERMANENT ROOM |
| PORTABLE ROOM |
| RESTROOMS |
| PLAY STRUCTURES |

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

# 19.4 MAGNOLIA PARK SCHOOL

## School Survey Results -Top 5 Needs

1. Inclusivity and Comprehensive Engagement
2. Environmental Sustainability
3. Equitable Improvements Across Schools
4. Consistent Vision
5. Catering to Varied Student Needs

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to page Appendix E.
- **Building**:
  - The modified bitumen roof covering had moderate deterioration and degranulation with evidence of past repairs.
  - Light Modernization

# 20.1 ADULT SCHOOL



Building A



Building A



Building A



Building B



Building B



Building C

# 20.2 ADULT SCHOOL



Hallway



Multipurpose Room



Multipurpose Room




ESL Office



Break Room



Computer Lab

# 20.3 ADULT SCHOOL

## FACILITY

| | |
|---|---|
| Address | 3811 Allan Ave, Burbank, CA 91505 |
| Year Constructed | 1948 |
| Acreage | 4.5 ac |
| Estimated Capacity | 675 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 11 | 48,013 sf |
| Permanent | 8 | 45,958 sf |
| Portable | 2 | 2,055 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | 18 and up |
| Special Programs | ESL, CTE, Parent Education, Adult Secondary Education/High School Diploma, Adult Basic Education, Enrichment Classes, FACTS |




Source: *GOOGLE MAPS 2022*

# 20.3 ADULT SCHOOL

## FACILITY

| | |
|---|---|
| Address | 3811 Allan Ave,<br>Burbank, CA 91505 |
| Year Constructed | 1945 BLDG C<br>1945 BLDG E<br>1945 BLDG G<br>1947 BLDG D<br>1947 BLDG F<br>1948 BLDG A<br>1948 BLDG B<br>1949 BLDG H<br>2018 Portable 29<br>2019 Portable 30 |
| Acreage | 4.5 ac |
| Estimated Capacity | 675 |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 11 | 48,013 sf |
| Permanent | 8 | 45,958 sf |
| Portable | 2 | 2,055 sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | 18 and up |
| Special Programs | ESL, CTE, Parent Education, Adult Secondary Education/High School Diploma, Adult Basic Education, Enrichment Classes, FACTS |




Source: *GOOGLE MAPS 2022*

# 20.4 ADULT SCHOOL

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| General Education Classroom | 27 |
| Special Ed | 0 |
| **Teaching Spaces Subtotal** | 27 |

## NON-LOADED SPACES

| |
|---|
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT ) |
| Restroom/Service |

LEGEND

| |
|---|
| CAMPUS ENTRY |
| PERMANENT ROOM |
| PORTABLE ROOM |
| RESTROOMS |
| PLAY STRUCTURES |

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

# 20.5 ADULT SCHOOL

## School Survey Results -Top 5 Needs

1. Ensuring Safety and Equitable Development
2. Early Childhood Education and Creative Spaces
3. Inclusive Governance and Vision
4. Technological Upgrades and Cost Reduction
5. Modernizing Infrastructure for Optimal Learning

## Site Request Needs

**Grounds**
- No vestibule to limit access
- Need cameras
- Need exterior lighting

**Building**
- New furniture matching
- HVAC leaks
- New paint job
- Renew marquee

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to page Appendix E.
- **Building**:
  - Technology renewed and new system 21st century classroom. Move out cabinets, give more room to classrooms
  - Light modernization
- **Site**:
  - Wiring and infrastructure, Have an exit on back side in fencing for multiple routes during emergencies

# 21.1 INDEPENDENT LEARNING CENTER ILA



Portable Classroom



Restroom



Portable Classroom



Portable Classroom



Restroom



Basketball Court

# 21.2 INDEPENDENT LEARNING CENTER ILA

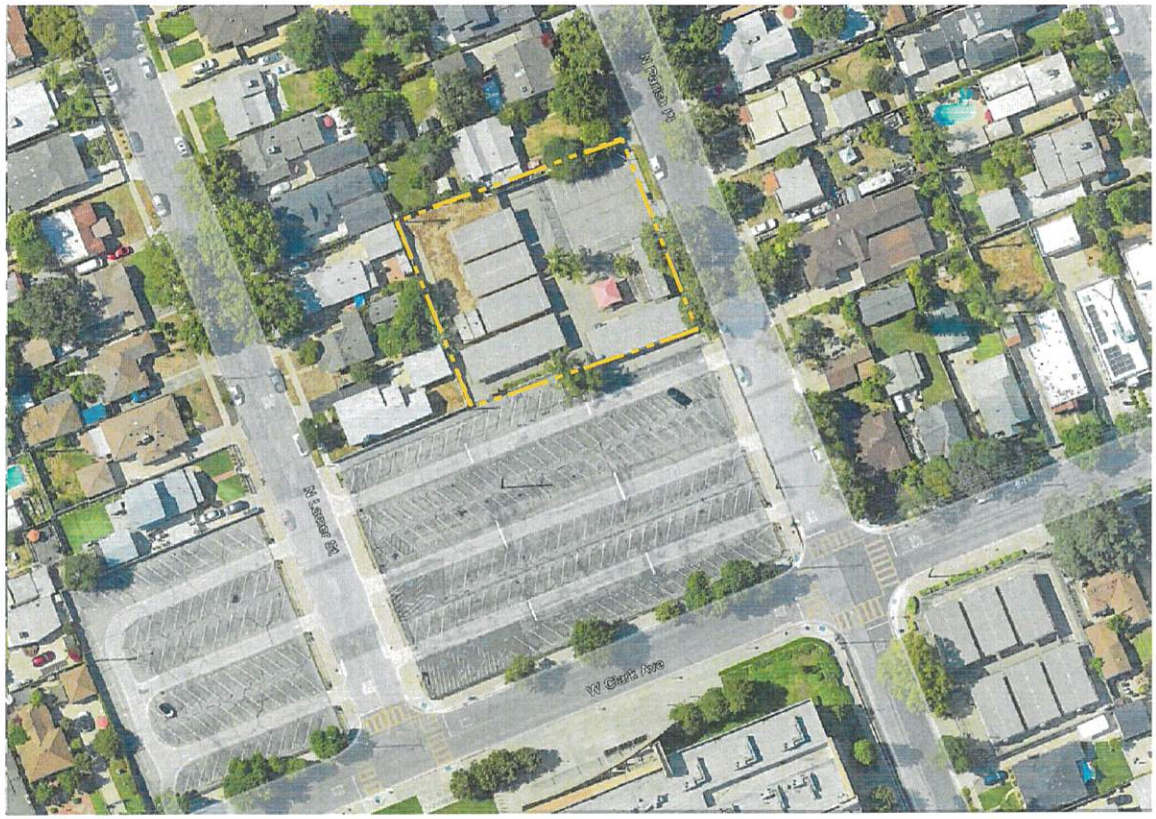
## FACILITY

| | |
|---|---|
| Address | 3715 W Allan Ave, Burbank, CA 91505 |
| Year Constructed | 2007 |
| Acreage | .1 ac |
| Estimated Capacity | |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | | sf |
| Permanent | | sf |
| Portable | 1 | sf |

## SCHOOL PROGRAM

| | |
|---|---|
| Grades Served | TK-12 |
| Special Programs | |




Source: *GOOGLE MAPS 2022*

# 21.3 INDEPENDENT LEARNING CENTER ILA

## SPACE UTILIZATION
## TEACHING SPACES (LOADED)

| Space Designation | Rooms |
|---|---|
| General Education Classroom | 0 |
| Special Ed | 0 |
| **Teaching Spaces Subtotal** | 0 |

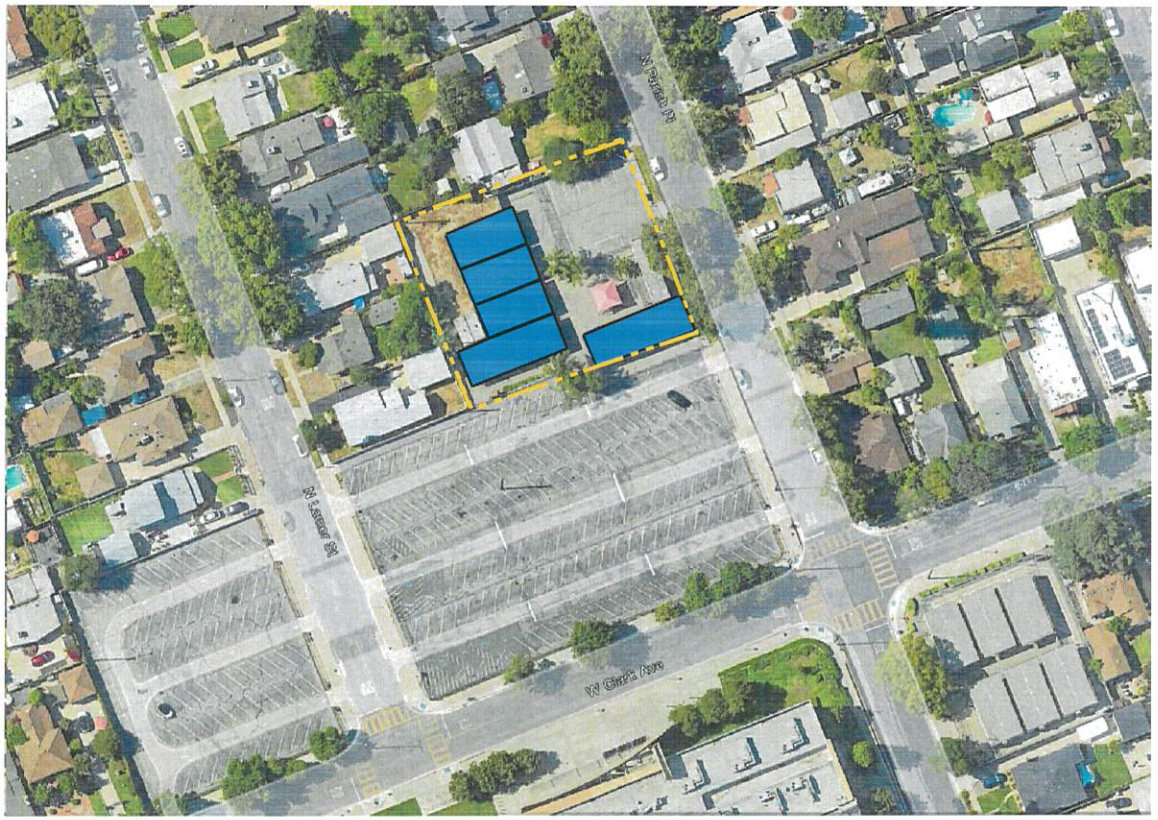
## NON-LOADED SPACES

| |
|---|
| Non-Loaded Student Spaces (Music, Art, Other Learning Spaces) |
| Support Spaces (Gym, Cafeteria, Library, Admin, Speech, Psych, Nurse, TOSA, Parent Center, RSP, SAI, OT ) |
| Restroom/Service |

LEGEND

| |
|---|
| CAMPUS ENTRY |
| PERMANENT ROOM |
| PORTABLE ROOM |
| RR RESTROOMS |
| PLAY STRUCTURES |

X: GRADE#
Y: ROOM#




Source: *GOOGLE MAPS 2022*

# 21.4 INDEPENDENT LEARNING CENTER ILA

## School Survey Results -Top 5 Needs

1. Inclusive Engagement and Unified Direction
2. Resource Efficiency and Sustainability
3. Equitable Improvements for Enhanced Learning
4. Catering to Varied Student Needs and Safety
5. Infrastructure Development for Enhanced Learning Environments

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to page Appendix E.
- **Building**:
  - Remove 2 portables
  - Modernize 3 portables
  - Build new 2,400 SF professional development center
- **Site**:
  - Wiring and infrastructure, Have an exit on back side in fencing for multiple routes during emergencies

# 22.1 ADMIN OFFICE

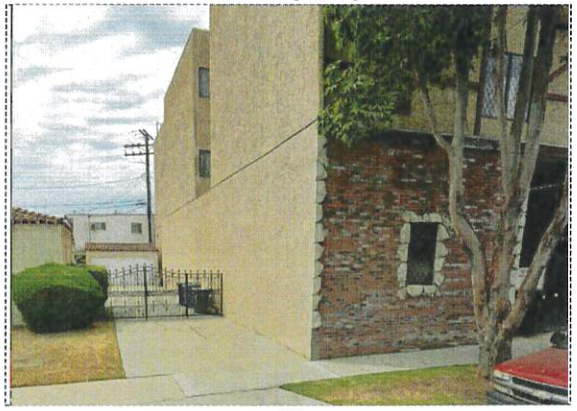


Building Entry


Parking Entry


Parking Entry


Parking Entry


Alley


Parking Entry

# 22.2 ADMIN OFFICE



Conference Room



Office



Office



File Room




Corridor



Conference Room

# 22.3 ADMIN OFFICE

**FACILITY**

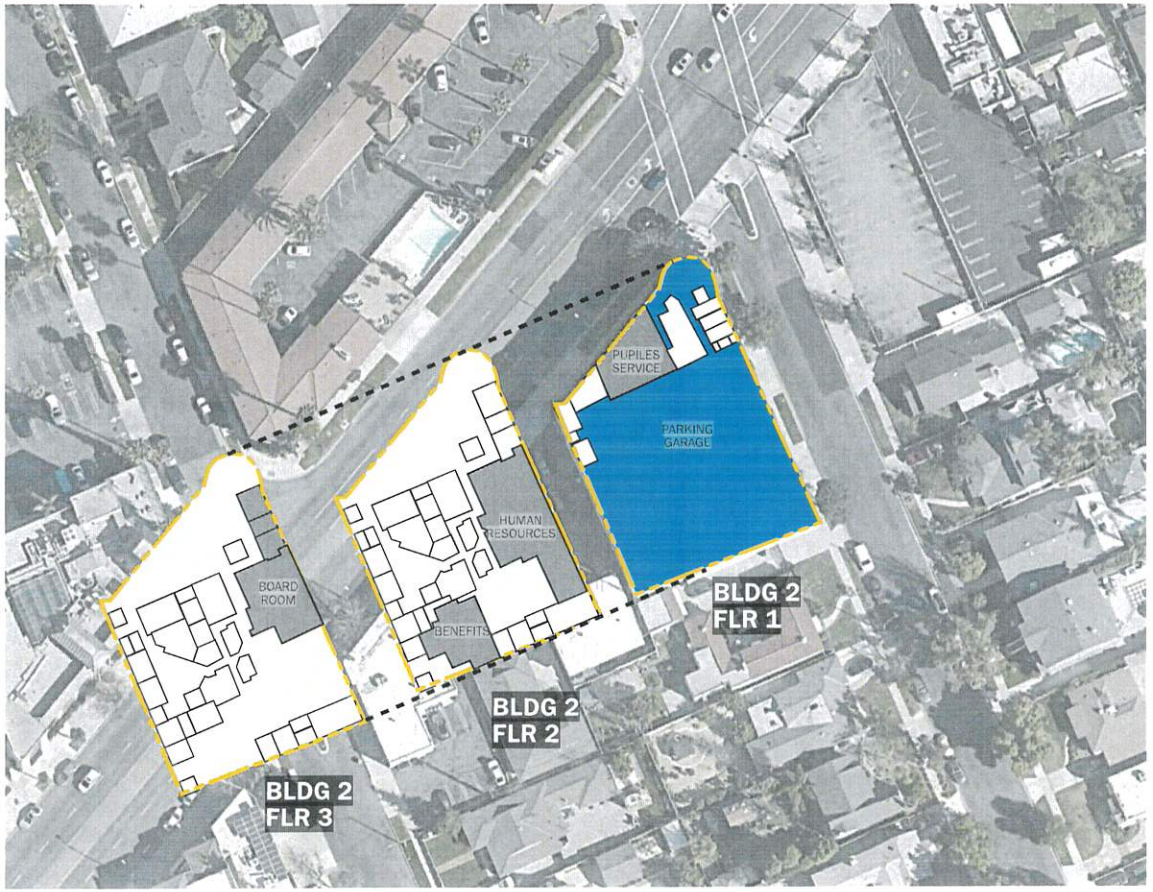
| | |
|---|---|
| Address | 1900 W OLIVE AVE, Burbank, CA 91506 |
| Year Constructed | 1960 BLDG 2 |
| Acreage | 0.4 ac |
| Estimated Capacity | |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 1 | 14,539 sf |
| Permanent | 1 | 14,539 sf |
| Portable | 0 | 0 sf |




Source: *GOOGLE MAPS 2022*

# 22.4 ADMIN OFFICE



# 22.5 ADMIN OFFICE

## School Survey Results -Top 5 Needs

1. Inclusive Engagement and Unified Direction
2. Resource Efficiency and Sustainability
3. Equitable Improvements for Enhanced Learning
4. Catering to Varied Student Needs and Safety
5. Infrastructure Development for Enhanced Learning Environments

## Site Request Needs

**Building**
- Underutilized spaces
- No square offices
- Face lift on front of building

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to page Appendix E.
- **Building**:
  - Light modernization
  - Update staff lounge areas
  - Check foundation and structure

# 23.1 DISTRICT SERVICE CENTER



Parking Lot




Main Building



Entrance



Parking Lot



Break Area

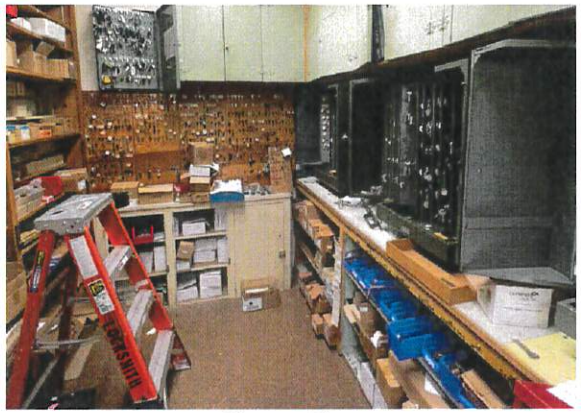


Parking Lot

# 23.2 DISTRICT SERVICE CENTER



Office



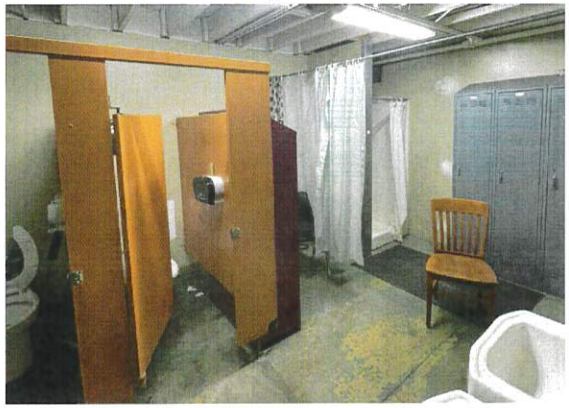
Storage Room



Break Room



Storage Room



Restroom



Storage Room

# 23.3 DISTRICT SERVICE CENTER

**FACILITY**

| | |
|---|---|
| Address | |
| Year Constructed | 1956 BLDG 1 |
| Acreage | 2.5 ac |
| Estimated Capacity | |
| Zoning | Public Facility |

| | Count | Area |
|---|---|---|
| Total | 1 | 40,351 sf |
| Permanent | 1 | 40,351 sf |
| Portable | | sf |



# 23.4 DISTRICT SERVICE CENTER




LEGEND

- CAMPUS ENTRY
- PERMANENT ROOM
- PORTABLE ROOM
- RR RESTROOMS
- PLAY STRUCTURES

X: GRADE#
Y: ROOM#

Source: *GOOGLE MAPS 2022*

02 SITE PROFILES

# 23.5 DISTRICT SERVICE CENTER

## Summarized Needs

**Program**
- Convert a meeting place into big lunch room

**Building**
- Roof is bad on the South side
- Underutilized spaces

## Proposed Potential Projects

- For a summary of universal upgrades required for all see refer to page 42-43.
- For site scope list and budgets refer to page Appendix E.
- **Building**:
  - Light modernization
  - Reconfigure space for storing standards of materials
  - Replace roof
  - Reconfigure meeting space into large lunch and lounge area for staff

# Appendix G:
# State Funding Report

CL CONSULTING, INC.

**EXECUTIVE SUMMARY**
**Burbank Unified School District Facilities Master Plan**

The Burbank Unified School District (BUSD) last participated in the State School Facility Program (SFP) in 2022. With the recently proposed general fund allocation of $2 Billion for the 2023-2024 state budget and the potential for a 2024 State Bond Initiative, the district will be in a great position to apply for potential state matching dollars over the next several years.

**MODERNIZATION ELIGIBILITY SUMMARY**

This SFP Modernization Eligibility Report estimates that BUSD may currently apply for up to $17,259,524 in remaining modernization eligibility at twenty (20) school sites with eligible DSA approved projects. This figure assumes the district would match a contribution of $11,529,362, which represents a total State Project amount of $28,788,886.

These figures are as of October 2023, and may increase due to additional buildings becoming of eligible age (20+ years for portables and 25+ for permanent buildings) based on the program requirements, enrollment increases and potential supplemental grants:

| School Site | Pupils Grants | Est. State Share (60% Share) | Est. District Share (40% Share) | Total |
|---|---|---|---|---|
| Bret Harte Elementary | 18 | $ 360,850 | $ 241,048 | $ 601,898 |
| Burbank High | 405 | $ 3,694,223 | $ 2,467,741 | $ 6,161,964 |
| Burbank Unified Independent Learning Academy (BUILA) | 0 | $ - | $ - | $ - |
| Burbank USD Community Day | 0 | $ - | $ - | $ - |
| Burroughs High | 27 | $ 227,529 | $ 151,989 | $ 379,518 |
| Dolores Huerta Middle (Aka Jordan Jr High) | 1,194 | $ 7,854,650 | $ 5,246,906 | $ 13,101,556 |
| George Washington Elementary | 9 | $ 68,556 | $ 45,795 | $ 114,351 |
| Joaquin Miller Elementary | 473 | $ 3,596,183 | $ 2,402,250 | $ 5,998,433 |
| John Muir Middle | 144 | $ 926,784 | $ 619,092 | $ 1,545,876 |
| Luther Burbank Middle | 0 | $ - | $ - | $ - |
| Magnolia Park | 0 | $ - | $ - | $ - |
| Monterey High (Continuation) | 15 | $ 126,405 | $ 84,439 | $ 210,844 |
| Providencia Elementary | 19 | $ 360,937 | $ 241,106 | $ 602,043 |
| R. L. Stevenson Elementary | 1 | $ 12,977 | $ 8,669 | $ 21,646 |
| Ralph Emerson Elementary | 0 | $ - | $ - | $ - |
| Theodore Roosevelt Elementary | 0 | $ - | $ - | $ - |
| Thomas Edison Elementary | 5 | $ 30,430 | $ 20,327 | $ 50,757 |
| Thomas Jefferson Elementary | 0 | $ - | $ - | $ - |
| Walt Disney Elementary | 0 | $ - | $ - | $ - |
| William McKinley Elementary | 0 | $ - | $ - | $ - |
| **MODERNIZATION TOTAL** | **2,310** | **$ 17,259,524** | **$ 11,529,362** | **$ 28,788,886** |

Disclaimer: This estimated eligibility value above is based on the pupil grants and the percent of eligible buildings over 50 versus 25 years old (from LPP funding date, as applicable) and includes some supplemental grants for ADA. All data and estimates are subject to change pending OPSC's review and potential regulation changes. State funding and timelines remain uncertain pending the availability bonds and other funding sources.

**Modernization Eligibility Determination Process**

The Eligibility Determination Process includes the establishment of a School Facilities Age Summary which considers a historical analysis of school site buildings ages based on original DSA approvals, last date the site received state modernization funds and the type of building. This analysis is completed for each school site. Next, CLC comports the building ages and deducts any previous received funding, which requires a review of all funding applications and records previously filed with the Office of Public School Construction. This process determines the current availability of modernization eligibility to establish for each school site.

**Modernization Funding Next Steps**

After the eligibility analysis is complete, any applicable SAB 50-03 forms are created and need to be filed with the Office of Public School Construction. This process establishes the available modernization eligibility as outlined in the table above.

CL Consulting, Inc. can provide the following optional services to include the following:

1. Review prior completed DSA approved projects for potential qualification of SFP requirements. This allows the district to file funding applications for completed projects as a reimbursement. This process would require submittal of completed plans to CDE for plan review and approval.
2. Strategize with the school district for project in planning and design to optimize maximum state funding opportunities. Prepare CDE plan approval submittals and file funding applications once DSA approval is received.

**NEW CONSTRUCTION ELIGIBILITY SUMMARY**

This SFP New Construction Eligibility Report estimates that BUSD may currently apply for up to $5,776,609 in New Construction Funding. The New Construction Eligibility is determined using the 2022/2023 CBEDS Enrollment on a District-Wide basis and projects the estimated of unhoused pupils based on the OPSC enrollment projection methodology. This program is a 50/50 match program. The BUSD would need to match the additional $5,776,609 for a total project grant funding of $11,553,218. As a result of this analysis, the BUSD is eligible for 3 Grades K-6, 11 Severe Special Day Class new classrooms. This program can only fund new classrooms added to a campus and must demonstrate a positive net-new classroom count if classrooms will be demolished as part of the project.

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| DISTRICT WIDE | K-6 | 7-8 | 9-12 | NS SDC | Severe SDC | Total |
|---|---|---|---|---|---|---|
| Baseline Eligible Grants | 6,951 | 1,930 | 5,160 | 464 | 82 | 14,587 |
| Reduced by Projects | (16) | (82) | (478) | (298) | 79 | (795) |
| Previous 50-01 Filed | (6,863) | (2,214) | (6,279) | (414) | (58) | (15,828) |
| **Available Eligibility** | **72** | **(366)** | **(1,597)** | **(248)** | **103** | **175** |
| **State Base Grant Funding** | **$1,150,776** | **($6,186,864)** | **($34,349,873)** | **($7,448,928)** | **$4,625,833** | **$5,776,609** |
| **Eligible Classrooms*** | **3** | **(14)** | **(59)** | **(19)** | **11** | **14** |

**Note:**
***Classroom loading for K-6= 25, 7-8= 27, 9-12= 27, NS SDC= 13, Severe SDC= 9**

### New Construction Eligibility Determination Process

The New Construction Eligibility is determined based on the projected district-wide enrollment and reduced by the district-wide classroom capacity as determined by the baseline documents filed in 2001. The analysis is further reduced by any prior SFP New Construction funding applicated awarded. The analysis is broken down by the grade levels in the table above.

### New Construction Funding Next Steps

Because the New Construction SFP process is different than the Modernization program, applications can only be filed for prospective projects. Funding applications will need to be filed before the new classroom project is occupied. It's important to note that the SFP will require a school district to update their New Construction Eligibility at the time that OPSC begins to review and process the funding application. This has taken several years after the original funding application is submitted. For districts that are projected to have declining enrollment, this can pose some risk to the funding application, as the further decline may not generate any positive New Construction Eligibility at the time the funding application is being reviewed.

## School Facilities Program (SFP)
## Potential Funding Sources

June 1, 2023

### Modernization

Utilizing the available Modernization Eligibility by school site, a modernization application can include any scope of work that does not increase square footage. This program will fund a project as a 60% state match / 40% local match up to the eligibility determination. You can also pursue a modernization grant by replacing existing classrooms with new classroom. This is referred to a like-kind exchange. You may apply for a modernization application at any time and includes projects completed as far back as 1998, if project records are available.

**New Construction**

This program requires that the district has New Construction Eligibility only, which is a result of the district's baseline capacity minus the projected enrollment. Many districts in the state are experiencing a decline in enrollment and do not have new construction eligibility available. This program will only fund the net new classrooms generated in a project and the application must be filed prior to occupancy. This program is a 50% state match / 50% local match plus 50% of eligible site development work.

**Minimum Essential Facilities / Use of Grants**

This program allows the use of New Construction Eligibility to fund Minimum Essential Facilities such as Gymnasiums, Multi-Purpose Rooms, and Libraries. Typically, when these types of projects are newly constructed, they are not funded by the SFP unless it is a new school project. In this case, if the MEF is undersized or does not exist, a district may choose to use their New Construction Eligibility on a MEF in lieu of building new classrooms. A school board resolution is required. The grant amount is determined by a Square Foot maximum calculation.

**Preschool, Transitional Kindergarten and Full-Day Kindergarten Facilities Grant Program**

This program is intended to fund the new construction or retrofit of existing classrooms to Title 5 compliant classrooms for this usage. While filing an application does not guarantee funding; if an application is approved, the district will be awarded a reservation of funds and will have 12 months to submit the required approvals such as the CDE plan approval and/or DSA-approved plans. The last round of filing ended March 2, 2023. Application eligibility is determined by the projected/actual enrollment for Preschool, Transitional Kindergarten and Full-Day Kindergarten for each school site minus the number of current Title 5 compliant classrooms. This program grant ranges from 50%-75% state match depending on the grade level. The application award is prioritized by percentage of free and reduced lunch.

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**Facility Hardship/AB300 Seismic Retrofit**

**Project Qualifications:**

Some of the factors that may be considered to determine program eligibility may include, but are not limited to:

- Damage or loss as a result of a natural disaster.
- Proximity to a major freeway, airport, electrical facility, or pipeline.
- Adverse air quality.
- Structural deficiencies.
- Site conditions such as faulting, toxic soils, or liquefaction.

For projects that do qualify, there are two types of Facility Hardship projects:

- Replacement – when the cost to mitigate the health and safety threat is greater than 50 percent of the cost of replacement; and
- Rehabilitation – when the cost to mitigate the health and safety threat is less than 50 percent of the cost of replacement.

**Submittal Requirements:**

- Facility Hardship Request
- Industry Specialist Report – Identification and substantiation of the health and safety threat and the minimum work necessary to mitigate the problem
- Governmental Concurrence – DSA
- Mitigation Measures – A letter/narrative describing the corrective plan and alternatives
- Detailed Cost Estimate
- Cost/Benefit Analysis
- Site Diagram
- Photos
- Application for Funding
- DSA Plan Approval Letter
- CDE Site/Plan Approval
- CTE Letter

**Funding**

A Facility Hardship application is treated identical to a New Construction (when a Replacement) or a Modernization (when a Repair) project. In this manner, the State/district contribution rations is 50/50 or 60/40 respectively.




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