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CITY OF SUNNYVALE
WATER POLLUTION CONTROL PLANT
DESIGN STANDARDS
ARCHITECTURAL

FINAL
January 2015



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1.0 PURPOSE AND CONTENT

The purpose of this document is to define typical architectural design criteria and material standards for new process structures to be constructed at the Donald M. Somers Water Pollution Control Plant in Sunnyvale, California. The WPCP is located at 1444 Borregas Avenue, in a mixed office - technology and light industrial area adjacent to the San Francisco Bay. These standards include descriptions of architectural features and materials, as well as guidelines for a consistent design aesthetic to be applied across new process structures throughout the plant. This document is only applicable to new structures whose program is wholly associated with process functions, and excludes any new administration, laboratory, operations, warehouse, or maintenance buildings.

2.0 STANDARD DEFINITIONS AND ABBREVIATIONS

2.1 Abbreviations

ADA	Americans with Disabilities Act
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
CBC	California Building Code: Part 2, California Building Standards Code, Title 24, California Code of Regulations
CMU	Concrete Masonry Unit
FRP	Fiber Reinforced Plastic
GA	Gauge
HM	Hollow Metal
LEED	Leadership in Energy and Environmental Design
N/A	Not Applicable
NAAMM	National Association of Architectural Metal Manufacturers
SRI	Solar Reflectance Index
TPO	Thermoplastic polyolefin

USGBC United States Green Building Council

VOC Volatile Organic Compound

WPCP Water Pollution Control Plant

2.2 Definitions

Coating Coating systems including primers, emulsions, enamels, stains, sealers, paints, and fillers, used as prime, intermediate, or finish coats.

Daylighting The use of natural light for internal building illumination.

Elevation The external face of a building or structure.

Flat Roof A weatherproof roof assembly with a shallow roof slope to allow for occasional access. Flat roof slope shall be a minimum of 1/4:12.

Galvanization The application of protective zinc layer to exterior steel for weatherproofing by hot dip process.

Low 'e'
Coating Low thermal emissivity film applied to glazing

Parapet Low wall along a roof edge.

Transom
Window A window set above the transom or header of a door.

3.0 CODES AND STANDARDS

All architectural design and construction will be performed in accordance with the most current version of the following codes and standards. The most stringent code or standard requirement has priority:

- City of Sunnyvale Standard Details and Specifications
<http://sunnyvale.ca.gov/Departments/PublicWorks/CityStandardDetailsandSpecifications.aspx>
- City of Sunnyvale Municipal Code <http://qcode.us/codes/sunnyvale/>
- City of Sunnyvale Consolidated General Plan
<http://sunnyvale.ca.gov/CodesandPolicies/GeneralPlan.aspx>
- City of Sunnyvale Citywide Design Guidelines (SDG)
<http://sunnyvale.ca.gov/Portals/0/Sunnyvale/CDD/Non-Residential/CityWideDesignGuidelines.pdf>

- California Building Code with California and City of Sunnyvale amendments and errata, Part 2, California Building Standards Code, Title 24, California Code of Regulations <http://www.bsc.ca.gov/Home/Current2013Codes.aspx>
- California Energy Code with California and City of Sunnyvale amendments and errata, Part 6, California Building Standards Code, Title 24, California Code of Regulations <http://www.bsc.ca.gov/Home/Current2013Codes.aspx>
- California Green Building Code (Cal Green) with California and City of Sunnyvale amendments and errata, Part 11, California Building Standards Code, Title 24, California Code of Regulations <http://www.bsc.ca.gov/Home/Current2013Codes.aspx>
- State of California Occupational Safety and Health Administration (CAL/OSHA) <http://www.dir.ca.gov/dosh/>
- ADA Accessibility Guidelines for Buildings and Facilities United States Access Board <http://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/background/adaag>
- Federal Occupational Safety and Health Administration (OSHA) <https://www.osha.gov/>
- American National Standards Institute (ANSI) <http://www.ansi.org/>
- American Society for Testing and Materials (ASTM) <http://www.astm.org/>
- Green Seal <http://www.greenseal.org/>

4.0 GUIDELINES

4.1 Programmatic Building Narratives

The following narrative summaries provide a broad overview of design constraints and opportunities for each of the different programmatic types of process structures and buildings to receive architectural treatment. Refer to sections 4.2 and 4.3 for specific design guidelines and material information.

4.1.1 Electrical Process Buildings

- Electrical process buildings shall generally be one-story buildings of either CMU or cast-in-place concrete construction, with a flat roof and parapet. Electrical process buildings include all facilities that house electrical equipment, including switchboards, meters, switchgear, electrical motors and controls, generators, transformers, or other associated electrical equipment. Examples of electrical buildings include Switchgear Building and Headworks Electrical Building.

- Openings in exterior walls should be coordinated with interior wall-mounted electrical equipment. Exterior wall space should generally be reserved for wall-mounted electrical equipment, including the possibility for expansion of additional future wall-mounted equipment. Openings for louvers, windows, and vents should be located close to doors where possible to avoid conflict with wall-mounted equipment.
- Due to security concerns for electrical equipment housed within, windows with pedestrian-level views of equipment inside are to be avoided. Windows for daylighting are acceptable at transom level above door headers provided they do not interfere with wall-mounted equipment or provide views of equipment inside.
- Protection of electrical equipment from exterior water intrusion is a paramount concern. Skylights are to be avoided to prevent damage to equipment in the unforeseen event of a leak. Roof drains and downspouts should be mounted to the building's exterior walls. Integral roof drains within the exterior wall assembly or the building interior are not permitted.
- Roof access is to be provided via external ladder or exterior stair. Provide cage when using a ladder with a height greater than twenty feet. Exterior stair is preferred option when equipment is roof mounted, if site constraints allow. Parapet height shall comply with CBC guardrail requirements.
- Coordinate with electrical engineer to avoid surface mounted electrical conduit at building exteriors where possible.

4.1.2 Mechanical Process Buildings

- Mechanical process buildings shall be one-story or two-story buildings of either CMU or cast-in-place concrete construction, with a flat roof and parapet. Mechanical process buildings include all facilities that house mechanical process equipment, including pumps, washers, bins, valves, piping, or other associated equipment. An example of a mechanical process building is the Grit and Screenings Handling Facility.
- Daylighting should be incorporated into mechanical process buildings when possible. Windows should not be provided at locations where interior processes are dirty or messy, such as near grit and screenings bins. Where appropriate, high windows above door transom or at clerestories may be used to daylight interior spaces. Skylights may be used when roof space is available and do not interfere with hatches for equipment removal and replacement.
- Roof drains and downspouts should be mounted to the building's exterior walls. For large buildings where it is not feasible to use exterior drains, it is acceptable to mount drains and downspouts at interior walls, provided that piping is sleeved through

envelope and directed to exterior storm drain. Integral roof drains within the exterior wall assembly are not permitted.

- Roof access is to be provided via external ladder, exterior stair or internal ladder and roof hatch. Provide cage when using a ladder with a height greater than twenty feet. Exterior stair is preferred option when equipment is roof mounted, if site constraints allow. Parapet height shall comply with CBC guardrail requirements.

4.1.3 Tanks and Basins

- Process tanks and basins of cast-in-place concrete construction over 5'-0" above finish grade shall receive architectural treatment. Process structure examples include the Primary Sedimentation Tanks and Grit Basins.
- Architectural treatment should be minimal and uncomplicated.
- Architectural treatment should not impact the structural integrity of the cast-in-place concrete or require additional reinforcing.
- Architectural treatment shall maintain minimum concrete cover over reinforcing steel as required by code or structural design criteria.

4.1.4 Canopies

- Canopies shall be used to protect exterior equipment from the elements. Canopy design shall be of consistent composition throughout the plant.
- Canopies should include gutters and downspouts for storm water run-off. Canopies do not need to be enclosed or shielded from horizontal driving rain.

4.2 Design Criteria

The following guidelines outline the criteria for a consistent design vocabulary that can be applied to structures of varying function, height, and structural materials.

4.2.1 Process Buildings

- Distinguish the lower level from the upper level at both one-story and two-story buildings by articulating different architectural treatments. The datum for the upper level begins at the top of the doorframe for one-story buildings, and at the top of the transom window frame for two-story buildings. See Appendix A for reference, and Section 4.3 for additional information.

For cast-in-place concrete buildings, vary the finish texture at each level:

Lower Level – Smooth Finish

Upper Level – Horizontal Board-formed Finish

For CMU buildings, vary the integral color at each level:

Lower Level – Grey

Upper Level – Tan

- Compose exterior elevations to break up large spaces on the building façade with shallow concrete reveals or accent courses of smaller CMU block. For cast-in-place concrete buildings, horizontal reveals shall be shallow to avoid establishment of pest habitat or accumulation of dirt and debris, approximately 2" high by ½" max deep, with a ½" chamfer each side. Reveals shall not reduce minimum concrete cover over reinforcing steel as required by code or structural design criteria. For CMU buildings, use horizontal courses of 4" split-face CMU. The same color block should be used for horizontal accent courses at both upper and lower levels. Spacing of horizontal elements should be consistent across buildings with different heights or structural materials. Reveals and accent courses should be spaced more closely together at the lower level to reference a pedestrian scale, and more widely spaced at the upper level. Horizontal elements should align with openings in the building exterior, such as the top of door, top of transom, and top and bottom of clerestory windows at the upper level. Narrow vertical reveals, approximately 1" wide by ½" max deep, shall also be used at cast-in-place concrete buildings, and similarly aligned with openings where possible. See Appendix A for reference.
- Maintain consistent proportion, scale, and alignment of window, door, louver or other openings. If possible, align the height of transom windows with the top of overhead roll-up doors where they occur. Windows should be rectangular shaped, and the same window proportion should be used for both transom windows and clerestory windows on the upper level.
- Integrate exterior building components into the overall elevation composition. Exterior stairs, landings, and ladders shall not interfere with openings or equipment. Downspouts and scuppers shall be located at regular intervals. Metal awnings may be incorporated over entry doors. Awnings should not be used at doors or removable transom window frames intended for installation and removal of equipment. Verify and coordinate location of all external equipment, including antennas and pipe penetrations.

4.2.2 Tanks and Basins

- Create accent panels of textured concrete at tank and basin elevations with shallow concrete form-liners. Width and depth of form-liner pattern shall not be conducive to establishment of pest habitat or collection of dirt and debris. The top 12" of tank and basin walls shall be free of any form-liner pattern.
- Textured concrete patterns shall not reduce minimum concrete cover over reinforcing steel as required by code or structural design criteria.

- Coordinate location of concrete control joints where occurring for regular proportion.
- Cast-in-place concrete shall not use integral colors, admixtures, or stains.

4.2.3 Canopies

- Canopies shall be steel frame with exposed metal deck and membrane or metal roofing.
- Structural steel shall be hot-dipped galvanized, primed and coated.
- Exposed metal deck shall be galvanized. Metal deck shall not be coated.
- Height and slope of canopy roof may vary respective to equipment underneath. Profiles, sections, and type of structural elements shall remain consistent throughout plant.
- Metal connections to be welded. Close weld any open steel section members. Angle grind exposed edges for smooth profile.

4.3 Architectural Materials

The building construction should utilize exterior materials and finishes that are durable, corrosion resistant, low maintenance, structurally efficient and aesthetically integrated throughout the plant. Materials shall be selected to meet sustainable design criteria for recycled content, regional availability, low embodied energy and compliance within VOC limits where noted.

The following section provides specific material information for architectural products, including brand, manufacturer, required performance characteristics, durability and maintenance requirements, color, material, and applicable standards.

4.3.1 Concrete

- Poured-in-place concrete mix to include recycled content (i.e. fly ash) where appropriate. See structural design standards for additional criteria.
- Board-formed Finish: Use prefabricated forming system of 6” or 8” horizontal board spacing pattern. Profile similar to Spec Formliners Inc., ‘Weathered Tongue and Groove’ pattern #1213, or equivalent. See Appendix B for reference.
- Smooth concrete finish: Sack and patch all imperfections, final finish with burlap or sponge float, moist cure for uniform texture and color.
- Formliner at tanks and basins: Prefabricated forming system with vertical ribbed pattern. Profile similar to Fitzgerald Formliners, Pattern #14313, or equivalent. See Appendix B for reference.

4.3.2 CMU

- Manufacturers (provided for reference only): Basalite Concrete Products, Calstone Company, or equivalent.
- CMU Lower Level Field:
 - Size: 8" high by 16" long. Width to be determined by structural engineer.
 - Pattern: Running Bond;
 - Color: Neutral Grey tone, Basalite Color #825L, or equivalent. Final color to be selected by city.
 - Finish: Shotblast
- CMU Upper Level Field:
 - Size: 8" high by 16" long. Width to be determined by structural engineer.
 - Pattern: Running Bond;
 - Color: Neutral Tan tone, Basalite Color #813L, or equivalent. Final color to be selected by city.
 - Finish: Shotblast
- CMU Accent Course:
 - Size: 4" high by 16" long. Width to be determined by structural engineer.
 - Pattern: Running Bond;
 - Color: Neutral Grey tone, Basalite Color #825L, or equivalent. Final color to be selected by city.
 - Finish: Splitface
- Mortar and Grout: Natural Grey color
- Exposed concrete masonry at all process buildings to receive a water repellant coating.
- Meet LEED MR Credit 4 – Recycled Content and MR Credit 5 Regional Materials when possible. Blocks to have minimum 20% recycled content. Manufacturer to be within 500 miles of job site.

4.3.3 Metal Awnings

- Bent plate steel awnings where occur over entry doors. Coating to match HM door frames.

4.3.4 Architectural Louvers

- Steel, factory finish. Provide acoustic louvers where required.

4.3.5 Stairs, Ladders, and Handrails

- Stairs: Aluminum alloy stringers, treads, and grating.
- Ladder and Cage: Aluminum alloy, solid square rungs with anti-slip finish on top, with cage for ladders over 20 feet high. Provide OSHA compliant fall prevention system.
- Handrails: Aluminum alloy, schedule 40, clear anodized finish, per ASTM B 429.
- Guardrails: Aluminum alloy three-rail, in locations not required to be accessible, clear anodized finish, per ASTM B 429.

4.3.6 Canopies

- Low slope metal roof or membrane roof per section 4.3.8.

4.3.7 Metal Conductor Heads and Downspouts

- Galvanized sheet metal conductor head: 12" W x 16" H x 6" D, coated, with 3"X3" overflow block-out each side.
- Metal Downspout: 4" x 3" rectangular section, coated.
- Flashing: Avoid dissimilar metals. Coatings to comply with NAAMM Metal Flashing for Architectural and Metal Products.

4.3.8 Membrane Roofing

- Adhered single-ply thermoplastic TPO roofing system. Provide vapor retarder layer, protection board and polyisocyanurate foam core rigid insulation over metal deck as required by manufacturer and/or energy performance metrics. Roofing system to meet minimum solar reflectance index per current energy code.

4.3.9 Hollow Metal Frames

- HM Door Frames (Exterior and Interior): Galvanized 16 GA steel, with mitered corners, full profile welded and ground, primed and painted. Knock-down and face welded frames are not acceptable. Meet ANSI / SDI A250.8 standards.

4.3.10 Doors

- FRP Doors (Exterior): High strength weather resistant pultruded fiberglass, factory finish. Milgard 'Ultra Series, Pultruded Fiberglass Door'; Inline Fiberglass 'Fiberglass Door'; Therma-Tru 'Fiberglass Door'; or equal.
- HM Doors (Exterior): Galvanized 16 GA steel, primed and painted. Fully insulated core.

- HM Doors (Interior): 18 GA steel, primed and painted. Standard core.
- Provide half-light glazing at exterior entry doors.

4.3.11 Overhead Doors

- Insulated Steel Overhead Coiling Door: Cookson Company, 'Insulated Rolling Door' model, or equivalent. Enclose curtain coil and counterbalance mechanism in 24 GA galvanized steel hood.

4.3.12 Door Hardware

- Hardware: Provide the following manufacturers, or equivalent: Locksets, Latch-sets, Cylinders: Schlage, Best Access System, or equal.
- Finish: Stainless steel.
- Coordinate keying system with plant access management standards including card readers for all exterior doors.

4.3.13 Windows and Glazing

- Aluminum Windows: Kawneer Trifab VG 451, Vistawall, or equivalent. Extruded aluminum frame, clear anodized finish. Optional Integral aluminum sunshades, Kawneer Versoleil Single Blade Horizontal Sunshade or equivalent to control glare and heat gain.
- Hollow Metal Framed Windows: Galvanized 16 GA steel, with mitered corners, full profile welded and ground, primed and painted.
- Glazing: Insulated glass assembly, 1" thick, low e coating on airspace side of outer lite. Provide laminated or acoustic assemblies where required for security or sound isolation.

4.3.14 Skylights

- Prismatic Skylight: Prismatic acrylic and/or polycarbonate glazed, aluminum frame, curb-mounted skylight; Sunoptics model 800MD or equivalent. Provide OSHA compliant standard skylight screen or fixed standard railing.
- Tubular Daylighting System: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube and diffuser assembly; Solatube International SkyVault model or equivalent.

4.3.15 Paint and Coatings

- Coat or paint all exterior HM doors, frames, and exposed exterior metal, including canopy structural members.
- Coat interior exposed beams and decking. Coat gypsum wallboard where occurring as part of interior insulation system at electrical rooms.
- Provide architectural coatings per the following schedule:

<u>Element</u>	<u>System</u>
Louvers	High Solids Epoxy and Polyurethane System
HM Doors and Frames	High Solids Epoxy and Polyurethane System
Aluminum Windows	Factory Finish
HM Window Frames	High Solids Epoxy and Polyurethane System
Overhead Doors	Factory Finish
Exposed Structural Steel-Exterior	High Solids Epoxy and Polyurethane System
Exposed Structural Steel-Interior	High Solids Epoxy and Polyurethane System
Exposed Metal Deck-Exterior	High Solids Epoxy and Polyurethane System
Exposed Metal Deck-Interior	High Solids Epoxy and Polyurethane System
Misc. Steel (Awnings)	High Solids Epoxy and Polyurethane System
Misc. Aluminum (Stairs, Rails)	Factory Finish
Metal Roofing and Soffit Panels	Factory Finish
Interior Gypsum Wallboard	Semigloss Latex

- Meet LEED IEQ Credit 4.2 Low Emitting Materials, Paints and Coatings requirements for VOC content. Paints, excluding high performance coatings, should have Green Seal certification.
- Colors: To be selected from with City input and approval as part of Primary Treatment Facility Project.

4.3.16 Signage

- Exterior Building Identification Signage: 6" high by ½" thick laser cut aluminum letters, square profile, coated. Surface mounted and projected off surface.

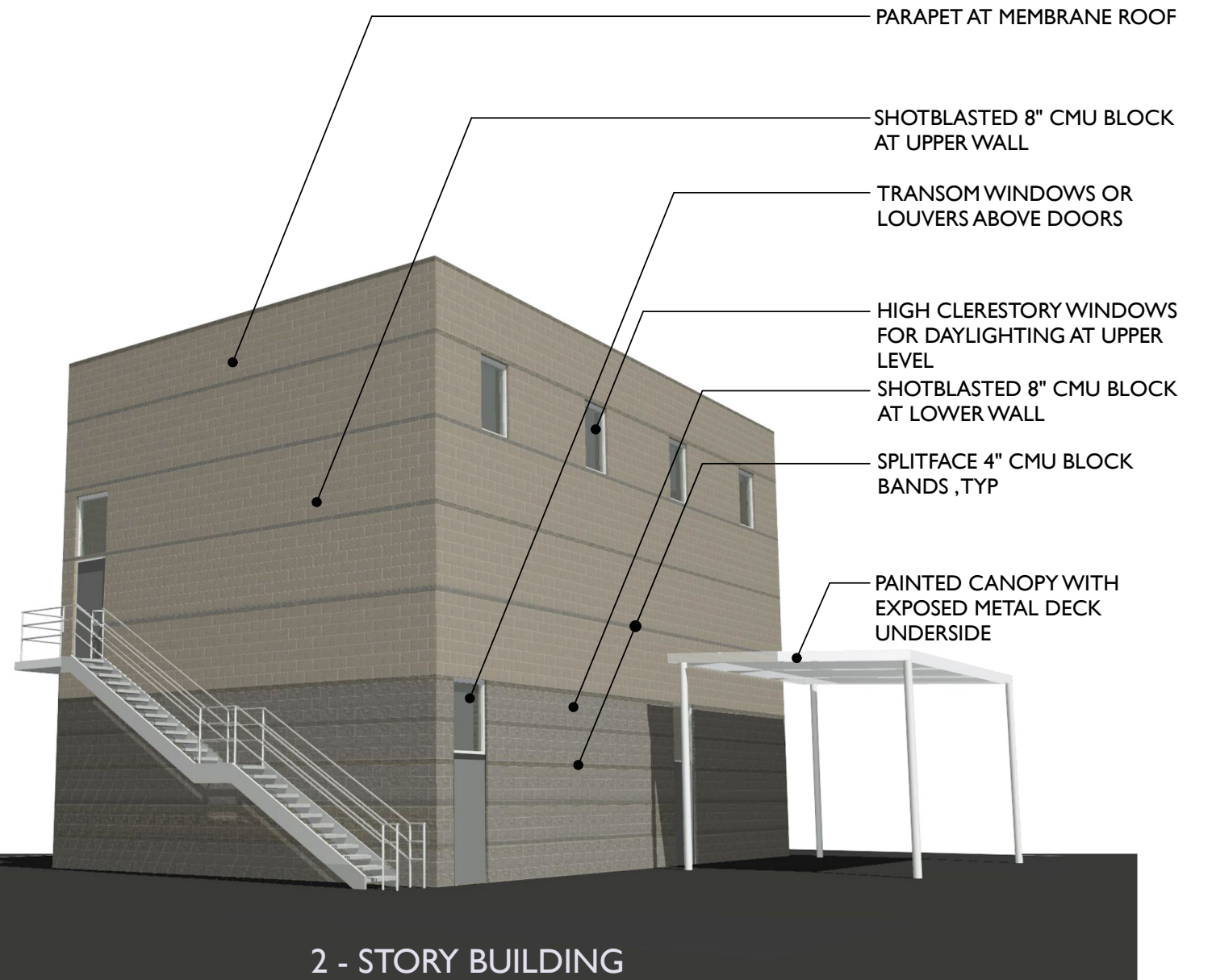
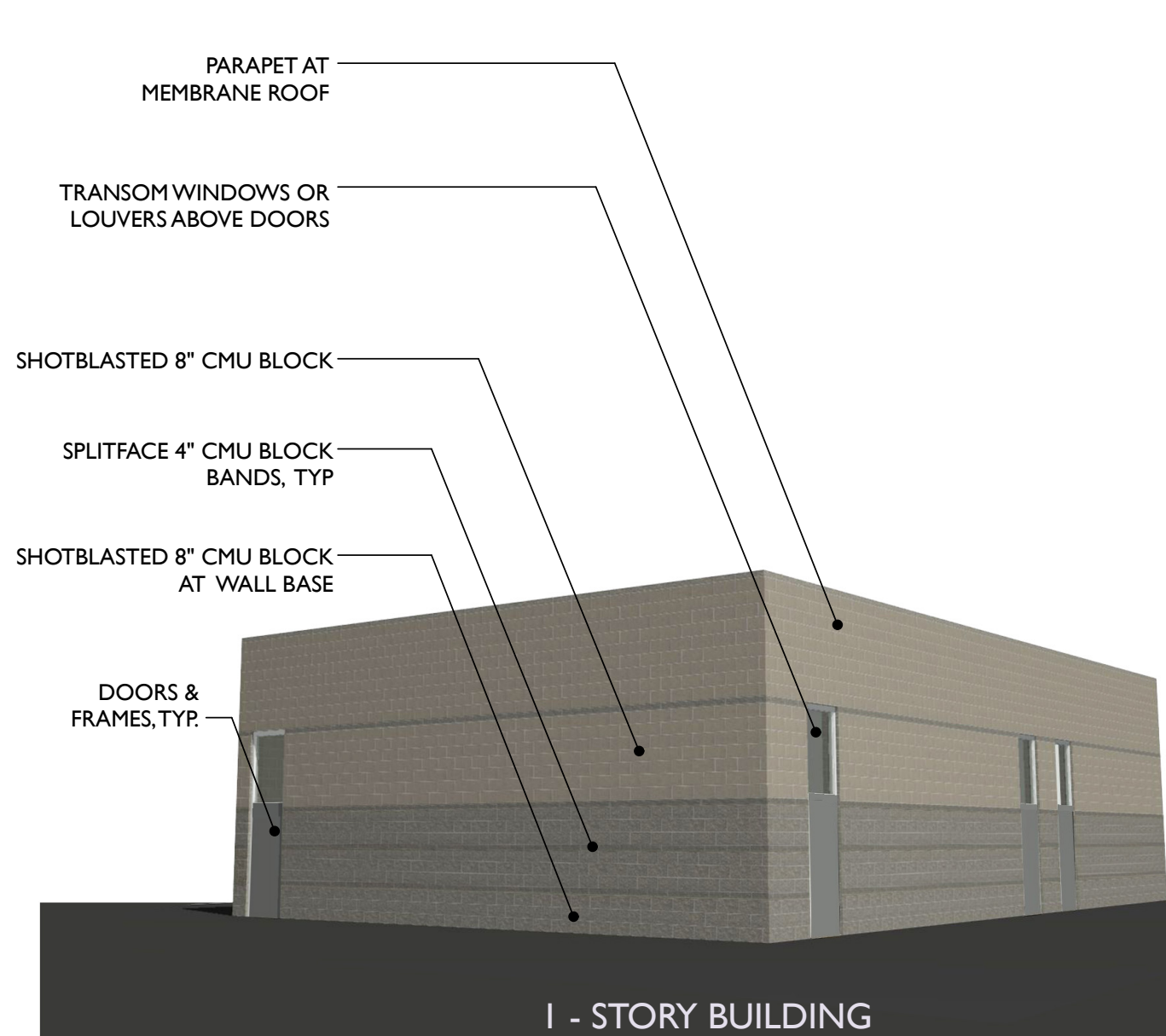
5.0 REFERENCES

The following WPCP documents may be useful in the design of WPCP process buildings and structures:

- WPCP Structural Design Standards
- WPCP Civil Design Standards

- WPCP Master Plan Site Layout TM

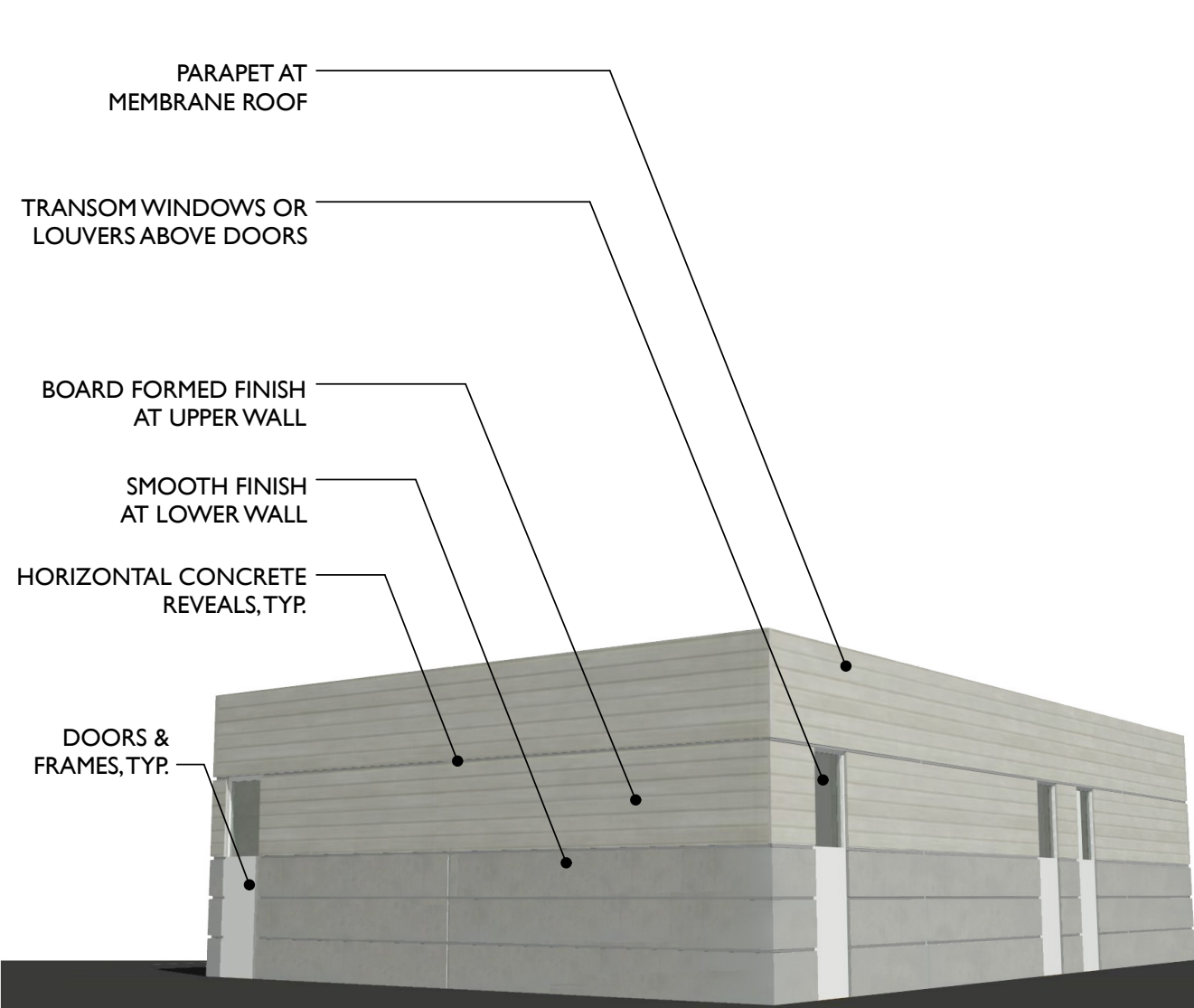
**APPENDIX A – DESIGN CRITERIA CONCEPTUAL
PERSPECTIVES**



DESIGN CRITERIA: CONCRETE MASONRY UNIT

Addendum A - Process Building Design Criteria
 WPCP Master Plan
 City of Sunnyvale
 1444 Borregas Avenue Sunnyvale, CA 94089

date: January 2015



PARAPET AT
MEMBRANE ROOF

TRANSOM WINDOWS OR
LOUVERS ABOVE DOORS

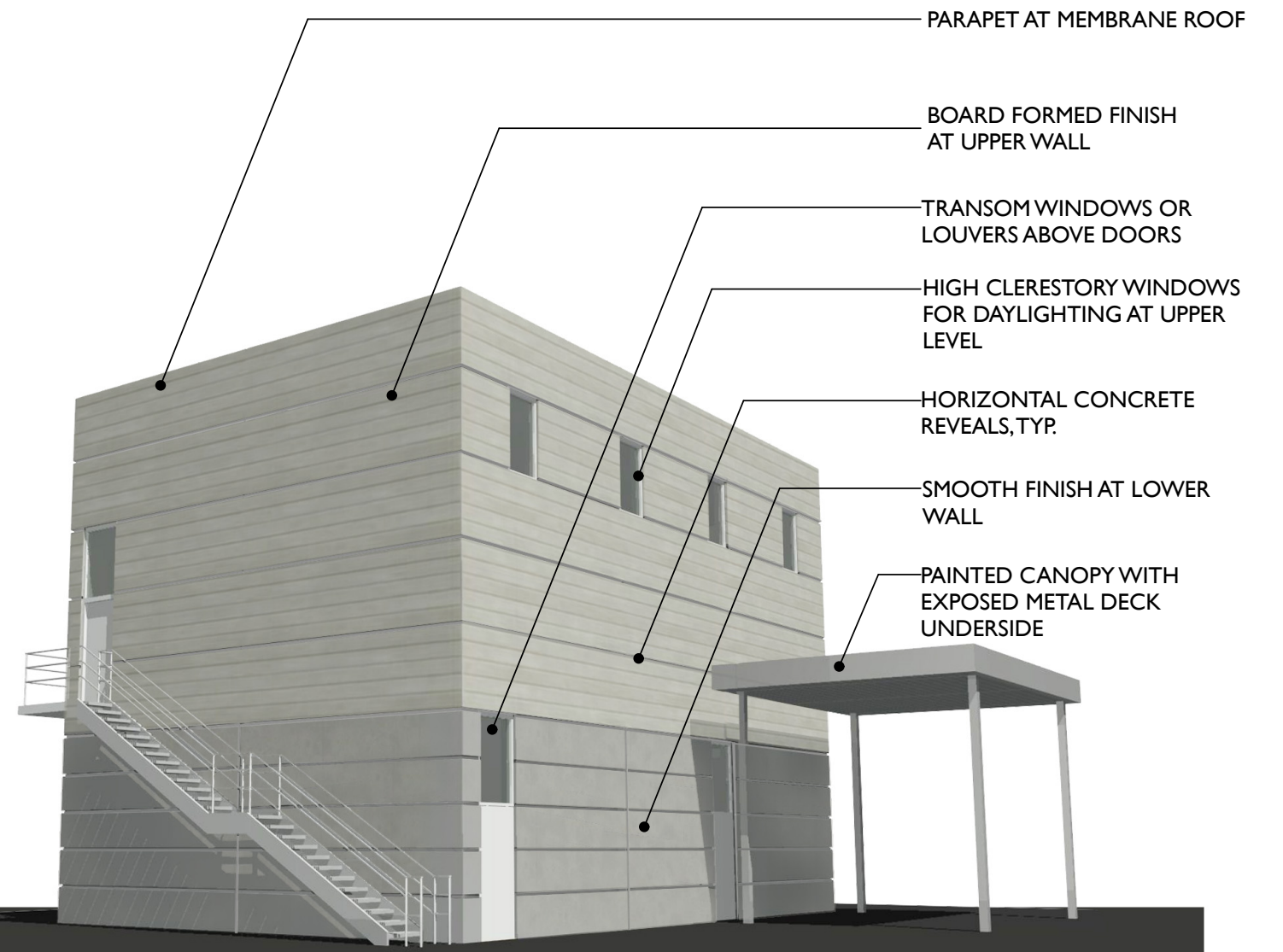
BOARD FORMED FINISH
AT UPPER WALL

SMOOTH FINISH
AT LOWER WALL

HORIZONTAL CONCRETE
REVEALS, TYP.

DOORS &
FRAMES, TYP.

1 - STORY BUILDING



PARAPET AT MEMBRANE ROOF

BOARD FORMED FINISH
AT UPPER WALL

TRANSOM WINDOWS OR
LOUVERS ABOVE DOORS

HIGH CLERESTORY WINDOWS
FOR DAYLIGHTING AT UPPER
LEVEL

HORIZONTAL CONCRETE
REVEALS, TYP.

SMOOTH FINISH AT LOWER
WALL

PAINTED CANOPY WITH
EXPOSED METAL DECK
UNDERSIDE

2 - STORY BUILDING

DESIGN CRITERIA: CAST IN PLACE CONCRETE

Addendum A - Process Building Design Criteria
WPCP Master Plan
 City of Sunnyvale
 1444 Borregas Avenue Sunnyvale, CA 94089

date: January 2015

APPENDIX B – PRODUCT CUTSHEETS



Spec Formliners, Inc.

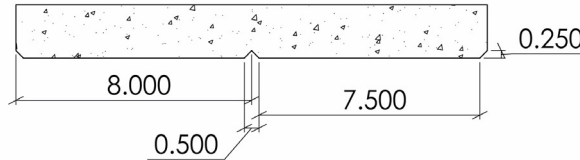
Impressive on Concrete



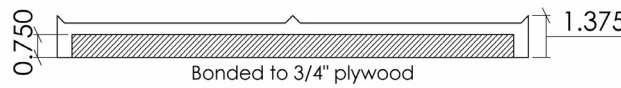
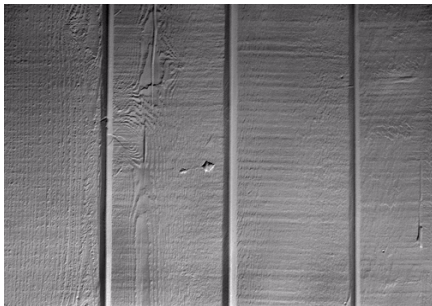
Pattern Number: **1213**

Weathered Tongue and Groove

7-1/2" (191mm) wide planks. 1/2" (13mm) x 1/4" (6mm) reveal.



CONCRETE



ElastoSpec™

Standard size 4'x8' and 4'x10'
Custom sizes in 8.0" increments
for width and lengths over 10'



ElastoSpec Lite™

Standard size 4'x8' and 4'x10'
Custom sizes in 8.0" increments
for width and lengths over 10'

Available Thicknesses:
0.070, 0.090, 0.110, and 0.150

ThermoSpec™
Standard size 4'x10'
Custom sizes: any less than 4'x10'

Visit www.specformliners.com for application guides and technical information

ThermoSpec™ SINGLE OR MULTI-USE PLASTIC

Property	HIPS	ABS
Tensile D638	3700	5300
IFlexural D7905	-	9300
Hardness D786	-	105
Material Weights - lbs/ft²		
0.070 MIL	0.110 MIL	0.150 MIL
0.393	0.621	0.843

ElastoSpec Lite™ Semi-Elastomeric MULTI-USE MATERIAL

Property	ASTM	Rating
Shore D	D2240	65
Tensile	D412	3000 psi
Elongation	D412	300%
Tear Strength	D2370	23 MPa
Material Weights - lbs/ft²		
Varies by Pattern		

ElastoSpec™ 100% Solid Urethane BONDED TO 3/4" PLYWOOD

Property	ASTM	Rating
Shore A	D2240	50-55
Tensile	D638	800 psi
Elongation	D638	600%
Tear Strength	D624	200 pli
Material Weights - lbs/ft²		
Varies by Pattern		

Call for ThermoSpec™ Standard Panel Sizes on this pattern. Custom Sizes and Art Panels available
ElastoSpec™ Customized Panel Sizes and Art Panels



Forming The Future™

PATTERN 14313

Fluted Rib

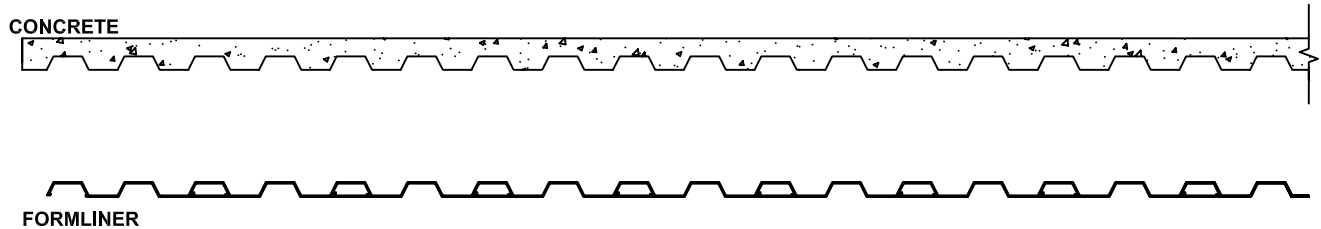
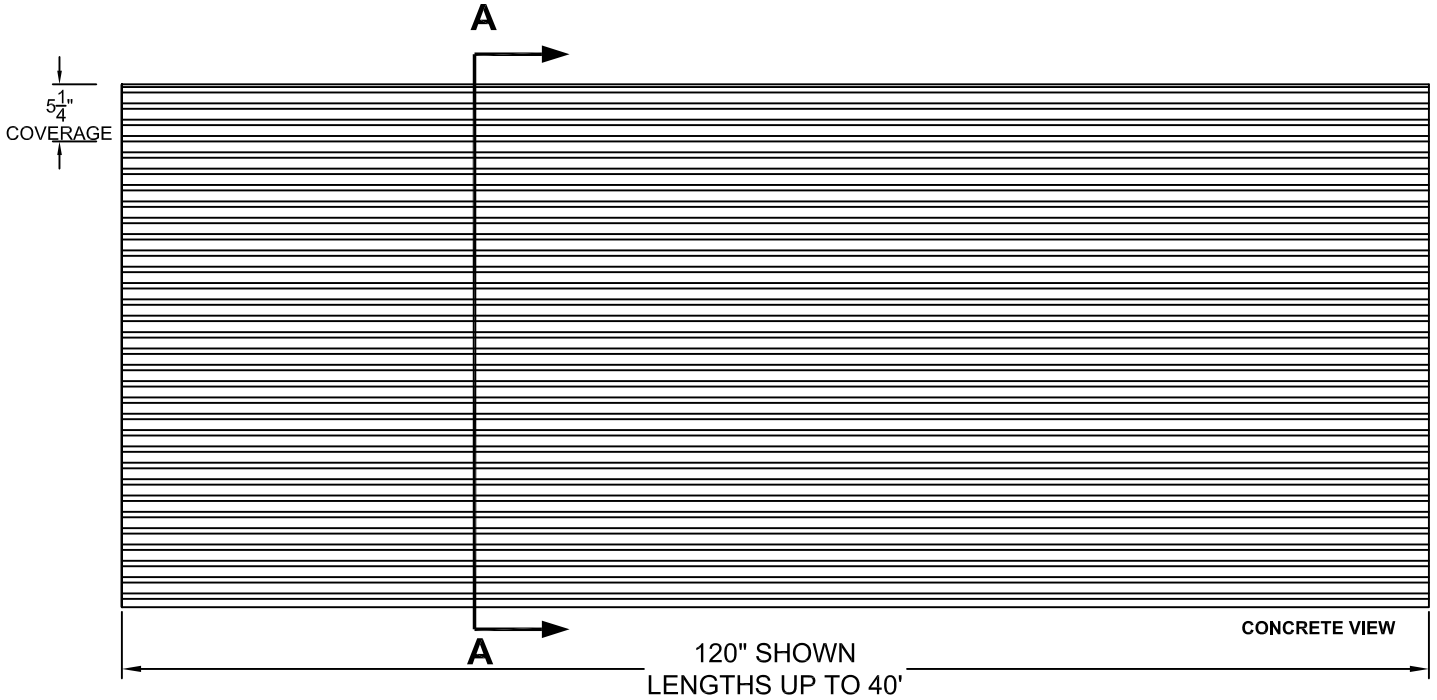
0.5" Depth, 2.625" On Center

VinyLok®

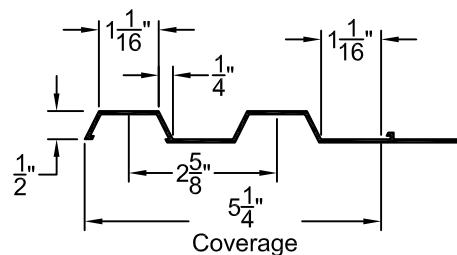
Styrene - Single Use.
ABS Plastic - Up to 10 reuses.

Fluted Rib

Part Size:	5.25" coverage, length up to 40'
Max Depth:	0.5"
On Center:	2.625"
Peak:	1.0625"
Valley:	1.0625"
Draft:	0.25"



SECTION A-A



FORMLINER DETAIL

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Pattern can be requested in AutoCad format.

File Name: S-14313-VL-9-15-06

Page 1 of 1