DETAILED FACILITY STUDY

Seismic and Operational Upgrade to Fire Stations 54 and 55

VOLUME IV

DRAFT 07.20.2015

CITY OF SAN RAFAEL

ESSENTIAL FACILITIES STRATEGIC PLAN

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VOLUME IV. DETAILED FACILITY STUDY - SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATIONS 54 AND 55

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VOLUME IV: DETAILED FACILITY STUDY - SEISMIC AND OPERATIONAL UPGRADES TO FIRE STATIONS 54 AND 55

A. INTRODUCTION

Initially, both Fire Stations 54 and 55 were studied to be relocated to support the goal of increasing the response times to the freeway. Fire Station 55 is located at Pt. San Pedro and is often moved-up to the current Station 52 location to backfill when the Station 52 company is on a call. The goal was to find property for a replacement station mid-point between the existing Station 52 location and the existing Station 55 site. This followed up on the goal of relocating the Station 52 company to a headquarters facility anticipated to be sited near 2nd and D Streets in the Downtown area. When it was learned that moving Station 52 to the proposed Headquarters Fire Station south of Downtown was not feasible due to cost and flood zone issues, Station 55 was studied to be renovated.

A similar discovery process was completed for Fire Station 54. Initially, Station 54 was studied to be relocated to the Windward site so that a fire station could accompany the training function at this location. When it was learned that the site was located in a FEMA designated 100-year flood zone, relocating Station 54 was no longer an option. Similar to Station 55, this station was then studied for renovation.

A prototypical Space Needs Assessment was developed for a replacement single company station and was used to evaluate the existing stations and develop proposed renovations. Both Stations 54 and 55 have very similar floor plans and resulted in similar floor plan adjustment recommendations. Structurally the buildings are quite different and each requires a unique seismic improvement solution. Both sites do allow expansion to accommodate operational improvements and the Fire Station site has unallocated space which could be used for support operations in the future. Both of these stations are proposed to be renovated and expanded to provide improved seismic safety and operational efficiencies.

FIRE STATION 54 AT 46 CASTRO STREET: $3.5M – $4.0M BUDGET

The overall project budget is based on the Cost Plan prepared by Mack 5 and includes seismic renovation, MEP system replacement, interior reconfiguration and minor expansion to address the operational needs of a modern workforce. The station will continue to house Engine 54; however, Truck 54 will be relocated to either Station 52 or 51 for cross-staffing. The scope of work includes a complete seismic, operational, and systems upgrade.

Fire Station 54 features include:

- Seismic upgrade
- Four private bedrooms with two firefighter restrooms
- Dedicated laundry and building storage
- Dedicated turn-out storage room
- Dedicated fitness room
- New electrical main service and systems
- New plumbing and mechanical systems
- New fire sprinklers and fire alarm systems

- Upgraded building envelope with new windows and insulation
- New roof
- Refurbished site to correct drainage issues

Items not included:

- Added site area for improved on-site parking and training.

FIRE STATION 55 AT 955 PT. SAN PEDRO ROAD: $3.5M – $4.0M BUDGET

The overall project budget is based on the Cost Plan prepared by Mack 5 and includes seismic renovation, MEP system replacement, interior reconfiguration and minor expansion to address the operational needs of a modern workforce. The station will continue to provide the department wide turn-out storage which will be housed in the station expansion area. The scope of work includes a complete seismic, operational, and systems upgrade.

Fire Station 55 features include:

- Seismic upgrade
- Four private bedrooms with two firefighter restrooms
- Dedicated laundry and building storage
- Dedicated turn-out storage room
- Dedicated fitness room
- New electrical main service and systems
- New plumbing and mechanical systems
- New fire sprinklers and fire alarm systems
- Upgraded building envelope with new windows and insulation
- New roof
- Replacement of site paving and site fencing

Items not included:

- Replacement or relocation of modular building currently on-site.

B. SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 54 AT 46 CASTRO STREET

BASIS OF DESIGN - SPACE NEEDS OUTLINE

This section identified and itemizes the building spaces into an outline form indicating each space, the required attributes and the required square footage. The space needs of the project have been established through meetings with both the police department and fire department design team, site visits and multiple review meetings. The square footage requirements for each space are derived through the development of "component diagrams" reflecting the operations-based layout of each space and the use of space standards




SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 54 AT 46 CASTRO STREET

SINGLE COMPANY PROTOTYPE

EXISTING FIRE STATION 54 SITE

BASIS OF DESIGN - SPACE NEEDS OUTLINE

Single Company Station Company Make-up - CURRENT STAFFING	Total
Fire Engine - Captain, Engineer, Firefighter	3
Ambulance or Truck - Cross Staffed	0
TOTAL CURRENT STAFFING:	**3**

Finish Legend: A - Simple Finishes; B - Standard Office Finishes; C - Intense Finishes; D - Service Room Finishes

No.	Type of Space	Space Attributes	Single Company Prototype Square Footage				
SITE OPERATIONS			**Program**	**Size**	**Existing Area**	**Proposed per Plan**	**Finish**
	Firefighter Parking	8 firefighter parking spaces, secure and separate from public parking	2,400	10'x20' ea.	600	600	
	Visitor Parking	Two Total - One Accessible with ramp	400	10' x 20	0	0	
	Apparatus Washing Area	Adjacent to hydrant for refill and testing; locate at rear of App. Bays; provide clarifier for run-off	0	rear apron	front apron	front apron	
	Hose Maintenance Area	Use rear apron area for cleaning hose; roll wet and store on apparatus	0	rear apron	rear yard	rear yard	
	Yard Hydrant	Located at rear yard	0	rear apron	0	0	
	Generator Area	Located at rear yard	150	10'x15'	0	150	
	Fueling Area	None required	0	10'x15'	0	0	
	Trash Enclosure	Exterior access for service; space for trash cans and recycling bins	36	6' x 6'	0	0	
	Flagpole	Flagpole area with lighting	25	5'x5'	25	25	
	Outdoor Patio	Outdoor uses; adjacent to Kitchen	200	10'x20'	0	0	

	STATION - APP BAY/APP BAY SUPPORT		Program	Size	Existing Area	Proposed per Plan	Finish
1	Apparatus Bay (2 drive-through bays)	Engine, - Front line apparatus. Truck/ Ambulance (cross-staffed). Systems include tailpipe exhaust power cord drops to each vehicle; heating system; night lighting; auto-close doors; trench drains	2,000	(2) 20'x 50'	1,750	1,750	A
2	Medical Clean Up	Heavy Duty Shelving	80	8' x 10'	0	15	C
3	Medical Supply Storage	Small storage cabinet for medical supplies	12	3' x 4'	0	15	C
4	Yard Storage	Yard equipment, compressor	36	6' x 6'	145	80	A
5	Turnout Gear Room	12-turnout gear open metal storage lockers; continuous exhaust fan, floor drain, heavy duty shelving; wildland gear bags	108	9' x 12'	200	65	B
6	Work Shop Alcove	Work bench/shop area for vise, peg board, tool storage with large flat work surface, solvent tank, tool chest, storage cabinet, shop sink and 6LF for Hose storage.	90	3' x 30'	90	150	C
7	Janitor room	Service sink, mop rack; janitorial supplies	36	6' x 6'	16	40	B
8	Special Project Room	Room for assigned support duty such as turn-out, mask repair, hose repair, allows outsourced projects to be brought in house.	120	10' x 12'	0	0	C
	Station - App Bay/Support Subtotal		**2,482**		**2,201**	**2,115**	
	STATION - FIREFIGHTER OFFICES		**Program**	**Size**	**Existing Area**	**Proposed per Plan**	**Finish**
9	Station Public Lobby	Small entry point for public; with seating adjacent to the public restroom. Counter separation between office and lobby	72	6' x 12'	0	0	B
10	Station Public Restroom	Unisex, accessible near Lobby	64	8'x8'	0	0	C
11	Station Office	Shared office space for 2-persons; provide space for lateral file cabinets (one drawer per company) copy machine and office supply storage, book shelving.	120	10' x 12'	195	195	B
	Station - Firefighter Offices Subtotal		**256**		**195**	**195**	

	STATION - FIREFIGHTER QUARTERS		Program	Size	Existing Area	Proposed per Plan	Finish
12	Kitchen	2-refrigerators; 2-shift pantries; 1-dishwasher; gas range/oven with hood; large microwave; large double-bowl sink with disposer; prep sink at island; open to Dining Area	143	11’ x 13’	130	130	C
13	Dining Area	Seating for 6 persons; wall-mounted TV; open to kitchen; open to Day Room	180	12’ x 15’	190	190	B
14	Day Room	Seating for 4 with recliner chairs; entertainment center and book shelving; Open to Dining	192	12’ x 16’	190	190	B
15	Fitness Room	Dedicated Fitness Room	320	16’ x 20’	0	300	B
16	Laundry Room	Service sink; countertop; janitorial supplies; mop rack	80	8’ x 10’	0	85	C
17	Firefighter Bedroom	4-separate bedrooms each containing 4-lockers, desk, chair, wall-mounted TV, 1 bed	550	11’ x 12.5’ (4)	550	575	B
18	Firefighter Bathroom ADA	1 accessible restroom with shower, sink, toilet	72	8’ x 9’	0	110	C
19	Firefighter Bathroom	1 restroom with shower, sink, toilet	63	7’ x 9’	150	75	C
	Station - Firefighter Quarters Subtotal		**1,600**		**1,210**	**1,655**	
	UTILITY SUPPORT		**Program**	**Size**	**Existing Area**	**Proposed per Plan**	**Finish**
20	Mechanical Room	HVAC equipment; hot water heater; fire sprinkler riser	80	8’ x 10’	22	22	D
21	Electrical Room	Main service panel, fire alarm panel; sub panels	80	8’ x 10’	14	14	D
22	Communications Room	Telephone service racks, alert response system hub, data server hub, radio equipment; security system	120	10’ x 12’	16	16	D
	Utility Support/ Vertical Circulation Subtotal		**280**		**52**	**52**	

	SINGLE COMPANY SPACE NEEDS SUMMARY	Program		Existing Area	Proposed per Plan	Finish
	Station - App Bay/Bay Support Subtotal	2,482		2,201	2,115	
	Station - Firefighter Offices Subtotal	256		195	195	
	Station - Firefighter Quarters Subtotal	1,600		1,210	1,655	
	Utility Support Subtotal	280		52	52	
	BUILDING SUBTOTAL (SF)	**4,618**		**3,658**	**4,017**	
	Circulation at 30%	1,385		1,097	1,205	B
	SINGLE COMPANY PROTOTYPE GRAND TOTAL (SF)	**6,003**		**4,755**	**5,222**	

B. SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 54 AT 46 CASTRO STREET

OVERALL PROJECT BUDGET

This section identifies an overall project budget based on the following items:

- Building and Site Construction Costs w/ Equipment and Furnishings,
- Design and other Related Fees,
- Administrative, Permit, Bidding Costs, and
- Project Contingencies.




SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 54 AT 46 CASTRO STREET

SINGLE COMPANY PROTOTYPE

EXISTING FIRE STATION 54 SITE

OVERALL PROJECT BUDGET

A. Construction with Contingencies and Escalation

	QUANT	UNIT	Cost per Unit	Total	Notes
Fire Station					
Seismic and Operational Upgrade	1	LS	$1,642,000	$1,642,000	Refer to Estimate
On-Site Improvements	1	LS	$372,000	$372,000	Refer to estimate
Haz Mat Demo	1	EA	$15,000	$15,000	Allowance
Off-Site Improvements	1	LS	$0	$0	Included in Estimate
Temporary Facilities	-	LS	$0	$0	Move to nearby station during construction.
Specialty Equipment	1	LS	$0	$0	Refer to Estimate
Construction Subtotal:				**$2,029,000**	Project Allowance
Project Design Unknowns	20%	**%**	$2,029,000	$405,800	Allowance
Construction with Design Unknowns Subtotal:				**$2,434,800**	Project Allowance
Construction Contingency (10% of Construction)	10%	**%**	$2,434,800	$243,480	Allowance
Construction with Change Order Contingency Subtotal:				**$2,678,280**	Project Allowance
Project Escalation (5% per annum, compounded yearly)	10%	**%**	$2,678,280	$267,828	Annual rate to midpoint of Construction = 19 months (12 months design and 14 months construction)
Construction (Building Site, Specialty Equipment, Contingencies, Escalation)				**$2,946,108**	
Constructon Cost per SF of Building Area:				**$561.59**	

B. Design and Other Related Fees

	QUANT	UNIT	Cost Per Unit	TOTAL	Notes
Design Fees (A, C, L, S, MEP) - BASIC ON-SITE	12%	**%**	$2,946,108	$353,533	A/E fees including entitlements
Off-site/Street Improvement Drawings	15%	**%**	$0	$0	design for off site improvements

B. Design and Other Related Fees - Continued					
	QUANT	**UNIT**	**Cost Per Unit**	**TOTAL**	**Notes**
Cost Estimating	1	**LS**	$15,000	$15,000	Estimate for each phase of development
Boundary and Topographic Surveys	1	**LS**	$12,000	$12,000	Only topo survey
Erosion Control Plan	1	**LS**	$2,500	$2,500	Per Bldg Department Requirements
Waterproofing Consultant	0	**LS**	$10,000	$0	None anticipated
Lighting Designer	1	**LS**	$0	$0	None anticipated
Head In Data, Phone, Response, Security, AV Consultant	1	**LS**	$25,000	$25,000	Consultant to City or Arch.
LEED Documentation	0	**LS**	$60,000	$0	Not Required
Construction Management (5% of construction value)	5%	**%**	$2,946,108	$147,305	Day to day management during construction
Geotechnical Investigation	1	**LS**	$25,000	$25,000	Includes geohazards report
Haz Mat Study (Ground and (E) buildings)	1	**LS**	$5,000	$5,000	Testing only
Environmental (CEQA) Documentation	1	**LS**	$15,000	$15,000	Assume Neg Dec.
Commissioning	1	**LS**	$10,000	$10,000	As required for Cal Green
Continuous Inspection, Testing During Construction	1	**LS**	$15,000	$15,000	Allowance
			Subtotal Design Fees:	**$625,338**	
Fee Contingency (5% of total Fees)	5%	**%**	$625,338	$31,267	Allowance
Reimbursables (5% of total Fees)	5%	**%**	$625,338	$31,267	Project Allowance
			Total Design and Other Related Fees:	**$656,605**	

C. Administrative, Permit and Bidding Costs					
	QUANT	**UNIT**	**Cost Per Unit**	**Total**	**Notes**
Administration Costs	-	**LS**	$0	$0	Assume none charged to project
Legal Fees	1	**LS**	$5,000	$5,000	Allowance
Building Permit Costs	1%	**%**	$2,946,108	$29,461	Per Building Department
Plan Check Fees	0.5%	**%**	$2,946,108	$14,731	Per Building Department

C. Administrative, Permit and Bidding Costs - Continued					
	QUANT	**UNIT**	**Cost Per Unit**	**Total**	**Notes**
SWPP Fees (State Board Compliance)	1	**LS**	$0	$0	Included in estimate
Planning/Environmental Review Fees	1	**LS**	$20,000	$20,000	Allowance
Temporary Storage Costs	0	**LS**	$25,000	$0	Assume none required
Public Art	0	**LS**	$15,000	$0	Assume none required
Specialty Equipment	1	LS	$150,000	$150,000	Allowance
Furnishings	1	LS	$40,000	$40,000	Allowance
Bidding/Printing (noticing, blueprints, etc.)	1	**LS**	$7,500	$7,500	Allowance
Moving Costs (Two moves)	2	**LS**	$5,000	$10,000	Allowance
Utility Fees - (PG&E, sewer, water, telecom, other)	1	**LS**	$50,000	$50,000	Panel upgrade
Subtotal Administrative Costs:				**$326,692**	
Administrative Cost Contingency (5% of total Fees)	5%	**%**	$326,692	$16,335	Allowance
Total Administrative, Permit and Bidding Costs:				**$343,026**	

Division Totals:		
	Total	**Notes**
A. Construction with Contingencies and Escalation	$2,946,108	
B. Design and Other Related Fees	$656,605	
C. Administrative, Permit and Bidding Costs	$343,026	
Overall Project Budget:	**$3,945,739**	
Project Cost Per SF (5,246 SF):	**$752.14**	

Exclusions:

1. Real estate fees
2. Land acquisition costs
3. Program Level Bond Management Fees

B. SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 54 AT 46 CASTRO STREET

CONCEPTUAL FLOOR AND SITE ARRANGEMENT DIAGRAM

These studies graphically illustrate the initial arrangement concepts developed through discussion with the Project Design Team. Considerations in each scheme include:

- Circulation to and from site,
- Visitor parking and pedestrian access,
- Site operations adjacencies and activities, and
- City of San Rafael planning ordinances



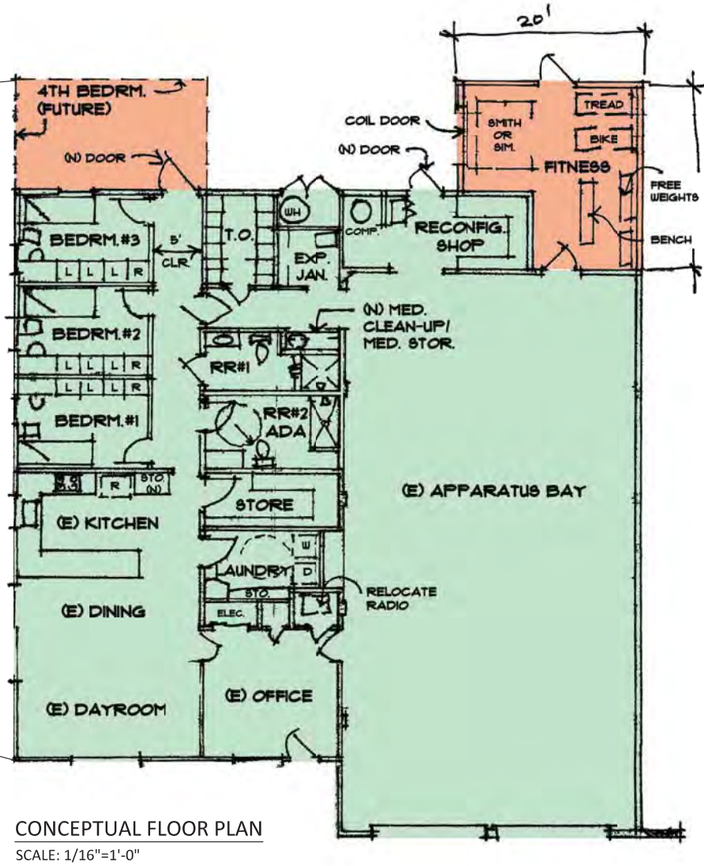

SITE ARRANGEMENT DIAGRAM
SCALE: 1/32"=1'-0"

EXISTING LOT AREA	±13,194 S.F.
EXISTING BUILDING AREA	±4,200 S.F.
PROPOSED BLDG. AREA	±4,780 S.F.
PROPOSED ADDED BLDG. AREA	±580 S.F.

LEGEND:

EXISTING BUILDING AREA

PROPOSED ADDED BLDG. AREA



CONCEPTUAL FLOOR PLAN
SCALE: 1/16"=1'-0"

FIRE STATION 54
46 CASTRO AVENUE

C. SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 55 AT 955 Pt. SAN PEDRO ROAD

BASIS OF DESIGN - SPACE NEEDS OUTLINE

This section identified and itemizes the building spaces into an outline form indicating each space, the required attributes and the required square footage. The space needs of the project have been established through meetings with both the police department and fire department design team, site visits and multiple review meetings. The square footage requirements for each space are derived through the development of "component diagrams" reflecting the operations-based layout of each space and the use of space standards




SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 55 AT 955 Pt. SAN PEDRO ROAD

SINGLE COMPANY PROTOTYPE

EXISTING FIRE STATION 55 SITE

BASIS OF DESIGN - SPACE NEEDS OUTLINE

Single Company Station Company Make-up - CURRENT STAFFING		Total
Fire Engine - Captain, Engineer, Firefighter	3	3
Ambulance or Truck - Cross Staffed	0	0
TOTAL CURRENT STAFFING:	**3**	**3**

Finish Legend: A - Simple Finishes; B - Standard Office Finishes; C - Intense Finishes; D - Service Room Finishes

No.	Type of Space	Space Attributes	Single Company Prototype Square Footage				
SITE OPERATIONS			**Program**	**Size**	**Existing Area**	**Proposed per Plan**	**Finish**
	Firefighter Parking	8 firefighter parking spaces, secure and separate from public parking	2,400	10'x20' ea.	800	800	
	Visitor Parking	Two Total - One Accessible with ramp	600	10' x 20	0	0	
	Apparatus Washing Area	Adjacent to hydrant for refill and testing; locate at rear of App. Bays; provide clarifier for run-off	0	rear apron	front apron	front apron	
	Hose Maintenance Area	Use rear apron area for cleaning hose; roll wet and store on apparatus	0	rear apron	rear yard	rear yard	
	Yard Hydrant	Located at rear yard	0	rear apron	0	0	
	Generator Area	Located at rear yard	150	10'x15'	0	150	
	Fueling Area	None required	0	10'x15'	40	40	
	Trash Enclosure	Exterior access for service; space for trash cans and recycling bins	36	6' x 6'	0	0	
	Flagpole	Flagpole area with lighting	25	5'x5'	25	25	
	Outdoor Patio	Outdoor uses; adjacent to Kitchen	200	10'x20'	500	500	

	STATION - APP BAY/APP BAY SUPPORT		Program	Size	Existing Area	Proposed per Plan	Finish
1	Apparatus Bay (2 drive-through bays)	Engine, - Front line apparatus. Truck/ Ambulance (cross-staffed). Systems include tailpipe exhaust power cord drops to each vehicle; heating system; night lighting; auto-close doors; trench drains	2,000	(2) 20'x 50'	1,750	1,750	A
2	Medical Clean Up	Heavy Duty Shelving	80	8' x 10'	0	15	C
3	Medical Supply Storage	Small storage cabinet for medical supplies	12	3' x 4'	0	15	C
4	Yard Storage	Yard equipment, compressor	36	6' x 6'	145	80	A
5	Turnout Gear Room	12-turnout gear open metal storage lockers; continuous exhaust fan, floor drain, heavy duty shelving; wildland gear bags	108	9' x 12'	200	65	B
6	Work Shop Alcove	Work bench/shop area for vise, peg board, tool storage with large flat work surface, solvent tank, tool chest, storage cabinet, shop sink and 6LF for Hose storage.	90	3' x 30'	90	150	C
7	Janitor room	Service sink, mop rack; janitorial supplies	36	6' x 6'	20	40	B
8	Special Project Room	Room for assigned support duty such as turn-out, mask repair, hose repair, allows outsourced projects to be brought in house.	120	10' x 12'	0	0	C
	Station - App Bay/Support Subtotal		**2,482**		**2,205**	**2,115**	
	STATION - FIREFIGHTER OFFICES		**Program**	**Size**	**Existing Area**	**Proposed per Plan**	**Finish**
9	Station Public Lobby	Small entry point for public; with seating adjacent to the public restroom. Counter separation between office and lobby	84	6' x 12'	0	0	B
10	Station Public Restroom	Unisex, accessible near Lobby	64	8'x8'	0	0	C
11	Station Office	Shared office space for 2-per-sons; provide space for lateral file cabinets (one drawer per com-pany) copy machine and office supply storage, book shelving.	120	10' x 12'	195	195	B
	Station - Firefighter Offices Subtotal		**268**		**195**	**195**	

	STATION - FIREFIGHTER QUARTERS		Program	Size	Existing Area	Proposed per Plan	Finish
12	Kitchen	2-refrigerators; 2-shift pantries; 1-dishwasher; gas range/oven with hood; large microwave; large double-bowl sink with disposer; prep sink at island; open to Dining Area	143	11’ x 13’	130	130	C
13	Dining Area	Seating for 6 persons; wall-mounted TV; open to kitchen; open to Day Room	180	12’ x 15’	190	190	B
14	Day Room	Seating for 4 with recliner chairs; entertainment center and book shelving; Open to Dining	192	12’ x 16’	190	190	B
15	Fitness Room	Dedicated Fitness Room	320	16’ x 20’	0	300	B
16	Laundry Room	Service sink; countertop; janitorial supplies; mop rack	80	8’ x 10’	0	85	C
17	Firefighter Bedroom	4-separate bedrooms each containing 4-lockers, desk, chair, wall-mounted TV, 1 bed	550	11’ x 12.5’ (4)	550	495	B
18	Firefighter Bathroom ADA	1 accessible restroom with shower, sink, toilet	72	8’ x 9’ (1)	0	110	C
19	Firefighter Bathroom	1 restroom with shower, sink, toilet	63	7’ x 9’	150	75	C
	Station - Firefighter Quarters Subtotal		**1,600**		**1,210**	**1,575**	
	UTILITY SUPPORT		**Program**	**Size**	**Existing Area**	**Proposed per Plan**	**Finish**
20	Mechanical Room	HVAC equipment; hot water heater; fire sprinkler riser	80	8’ x 10’	22	22	D
21	Electrical Room	Main service panel, fire alarm panel; sub panels	80	8’ x 10’	14	14	D
22	Communications Room	Telephone service racks, alert response system hub, data server hub, radio equipment; security system	120	10’ x 12’	16	16	D
	Utility Support/ Vertical Circulation Subtotal		**280**		**52**	**52**	

	SINGLE COMPANY SPACE NEEDS SUMMARY	Program		Existing Area	Proposed per Plan	Finish
	Station - App Bay/Bay Support Subtotal	2,482		2,205	2,115	
	Station - Firefighter Offices Subtotal	268		195	195	
	Station - Firefighter Quarters Subtotal	1,600		1,210	1,575	
	Utility Support Subtotal	280		52	52	
	BUILDING SUBTOTAL (SF)	**4,630**		**1,457**	**1,822**	
	Circulation at 30%	1,389		437	547	B
	SINGLE COMPANY PROTOTYPE GRAND TOTAL (SF)	**6,019**		**4,761**	**5,118**	

C. SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 55 AT 955 Pt. SAN PEDRO ROAD

OVERALL PROJECT BUDGET

This section identifies an overall project budget based on the following items:

- Building and Site Construction Costs w/ Equipment and Furnishings,
- Design and other Related Fees,
- Administrative, Permit, Bidding Costs, and
- Project Contingencies.




SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 55 AT 955 Pt. SAN PEDRO ROAD

SINGLE COMPANY PROTOTYPE

EXISTING FIRE STATION 55 SITE

OVERALL PROJECT BUDGET

A. Construction with Contingencies and Escalation

	QUANT	UNIT	Cost per Unit	Total	Notes
Fire Station					
Seismic and Operational Upgrade	1	LS	$1,533,000	$1,533,000	Refer to Estimate
On-Site Improvements	1	LS	$287,000	$287,000	Refer to estimate
Haz Mat Demo	1	EA	$15,000	$15,000	Allowance
Off-Site Improvements	1	LS	$0	$0	Included in Estimate
Temporary Facilities	-	LS	$0	$0	Move to nearby station during construction.
Specialty Equipment	1	LS	$0	$0	Refer to Estimate
Construction Subtotal:				**$1,835,000**	Project Allowance
Project Design Unknowns	20%	**%**	$1,835,000	$367,000	Allowance
Construction with Design Unknowns Subtotal:				**$2,202,000**	Project Allowance
Construction Contingency (10% of Construction)	10%	**%**	$2,202,000	$220,200	Allowance
Construction with Change Order Contingency Subtotal:				**$2,422,200**	Project Allowance
Project Escalation (5% per annum, compounded yearly)	10%	**%**	$2,422,200	$242,220	Annual rate to midpoint of Construction = 19 months (12 months design and 14 months construction)
Construction (Building Site, Specialty Equipment, Contingencies, Escalation)				**$2,664,420**	
Constructon Cost per SF of Building Area:				**$507.90**	

B. Design and Other Related Fees

	QUANT	UNIT	Cost Per Unit	TOTAL	Notes
Design Fees (A, C, L, S, MEP) - BASIC ON-SITE	12%	**%**	$2,664,420	$319,730	A/E fees including entitlements
Off-site/Street Improvement Drawings	15%	**%**	$0	$0	design for off site improvements

B. Design and Other Related Fees - Continued					
	QUANT	**UNIT**	**Cost Per Unit**	**TOTAL**	**Notes**
Cost Estimating	1	**LS**	$15,000	$15,000	Estimate for each phase of development
Boundary and Topographic Surveys	1	**LS**	$12,000	$12,000	Only topo survey
Erosion Control Plan	1	**LS**	$2,500	$2,500	Per Bldg Department Requirements
Waterproofing Consultant	0	**LS**	$10,000	$0	None anticipated
Lighting Designer	1	**LS**	$0	$0	None anticipated
Head In Data, Phone, Response, Security, AV Consultant	1	**LS**	$25,000	$25,000	Consultant to City or Arch.
LEED Documentation	0	**LS**	$60,000	$0	Not Required
Construction Management (5% of construction value)	5%	**%**	$2,664,420	$133,221	Day to day management during construction
Geotechnical Investigation	1	**LS**	$25,000	$25,000	Includes geohazards report
Haz Mat Study (Ground and (E) buildings)	1	**LS**	$5,000	$5,000	Testing only
Environmental (CEQA) Documentation	1	**LS**	$15,000	$15,000	Assume Neg Dec.
Commissioning	1	**LS**	$10,000	$10,000	As required for Cal Green
Continuous Inspection, Testing During Construction	1	**LS**	$15,000	$15,000	Allowance
			Subtotal Design Fees:	**$577,451**	
Fee Contingency (5% of total Fees)	5%	**%**	$577,451	$28,873	Allowance
Reimbursables (5% of total Fees)	5%	**%**	$577,451	$28,873	Project Allowance
			Total Design and Other Related Fees:	**$606,324**	

C. Administrative, Permit and Bidding Costs					
	QUANT	**UNIT**	**Cost Per Unit**	**Total**	**Notes**
Administration Costs	-	**LS**	$0	$0	Assume none charged to project
Legal Fees	1	**LS**	$5,000	$5,000	Allowance
Building Permit Costs	1%	**%**	$2,664,420	$26,644	Per Building Department
Plan Check Fees	0.5%	**%**	$2,664,420	$13,322	Per Building Department
SWPP Fees (State Board Compliance)	1	**LS**	$0	$0	Included in estimate

C. Administrative, Permit and Bidding Costs - Continued					
	QUANT	**UNIT**	**Cost Per Unit**	**TOTAL**	**Notes**
Planning/Environmental Review Fees	1	**LS**	$20,000	$20,000	Allowance
Temporary Storage Costs	0	**LS**	$25,000	$0	Assume none required
Public Art	0	**LS**	$15,000	$0	Assume none required
Specialty Equipment	1	LS	$150,000	$150,000	Allowance
Furnishings	1	LS	$40,000	$40,000	Allowance
Bidding/Printing (noticing, blue-prints, etc.)	1	**LS**	$7,500	$7,500	Allowance
Moving Costs (Two moves)	2	**LS**	$5,000	$10,000	Allowance
Utility Fees - (PG&E, sewer, water, telecom, other)	1	**LS**	$50,000	$50,000	Panel upgrade
Subtotal Administrative Costs:				**$322,466**	
Administrative Cost Contingency (5% of total Fees)	5%	**%**	$322,466	$16,123	Allowance
Total Administrative, Permit and Bidding Costs:				**$338,590**	

Division Totals:		
	Total	**Notes**
A. Construction with Contingencies and Escalation	$2,664,420	
B. Design and Other Related Fees	$606,324	
C. Administrative, Permit and Bidding Costs	$338,590	
Overall Project Budget:	**$3,609,334**	

Exclusions:

1. Real estate fees
2. Land acquisition costs
3. Program Level Bond Management Fees

C. SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 55 AT 955 Pt. SAN PEDRO ROAD

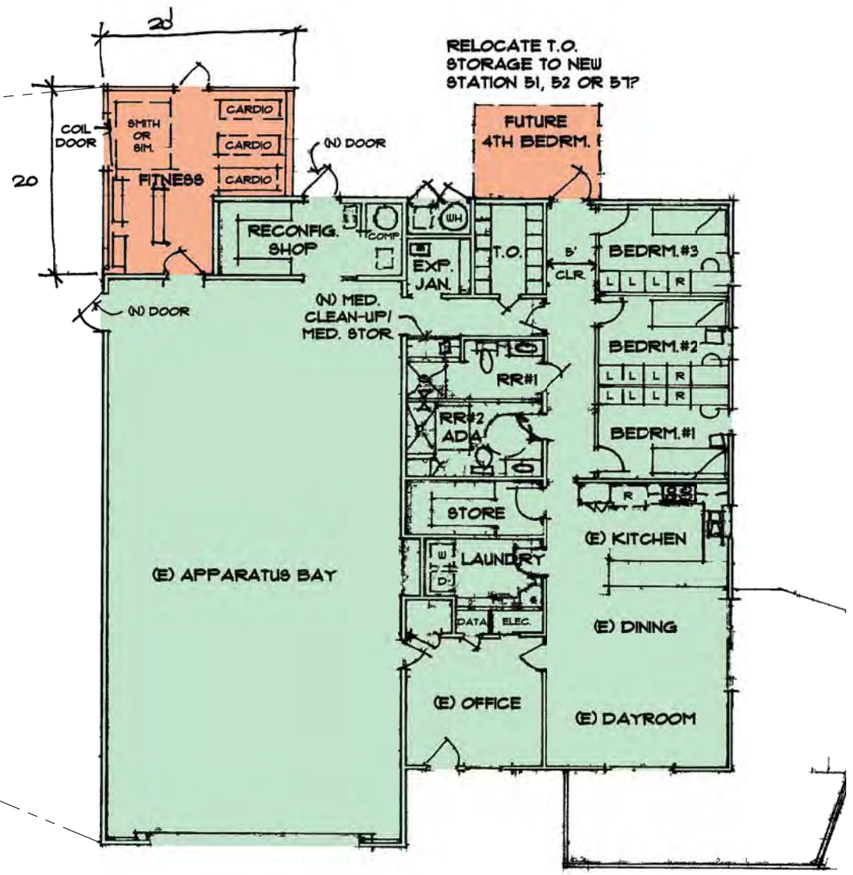
CONCEPTUAL FLOOR AND SITE ARRANGEMENT DIAGRAM

These studies graphically illustrate the initial arrangement concepts developed through discussion with the Project Design Team. Considerations in each scheme include:

- Circulation to and from site,
- Visitor parking and pedestrian access,
- Site operations adjacencies and activities, and
- City of San Rafael planning ordinances




SITE ARRANGEMENT DIAGRAM
SCALE: 1/32"=1'-0"



CONCEPTUAL FLOOR PLAN
SCALE: 1/16"=1'-0"

EXISTING LOT AREA	±34,065 S.F.
EXISTING BUILDING AREA	±4,200 S.F.
PROPOSED BLDG. AREA	±4,670 S.F.
PROPOSED ADDED BLDG. AREA	±470 S.F.

LEGEND:

EXISTING BUILDING AREA

PROPOSED ADDED BLDG. AREA

FIRE STATION 55

955 POINT SAN PEDRO ROAD

D. SINGLE COMPANY PROTOTYPICAL COMPONENT DIAGRAMS

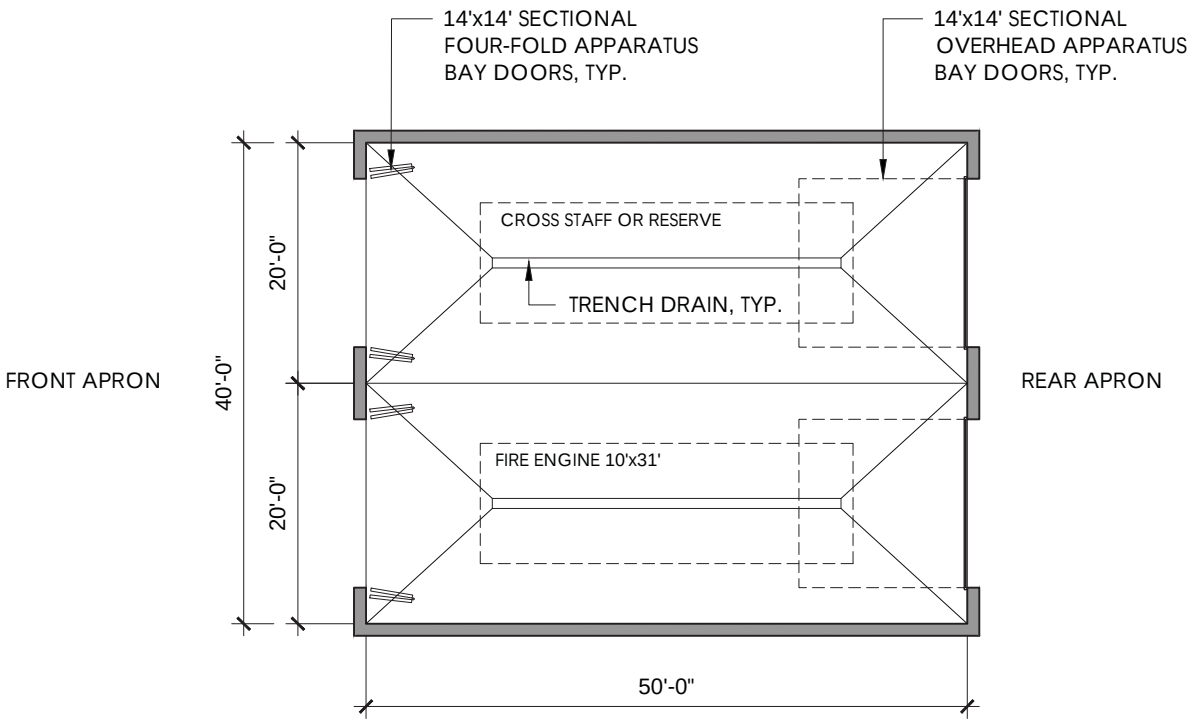
Component diagram use space standards and expand them into room diagrams that graphically illustrate the equipment and furniture arrangements in each required space and are used to determine the room area requirements. Considerations include:

- Number of staff to occupy the space at any given time,
- Equipment size and operating clearances,
- Circulation within the space, and
- Furniture layout for efficient space use.




- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - APPARATUS BAY/APPARATUS BAY SUPPORT

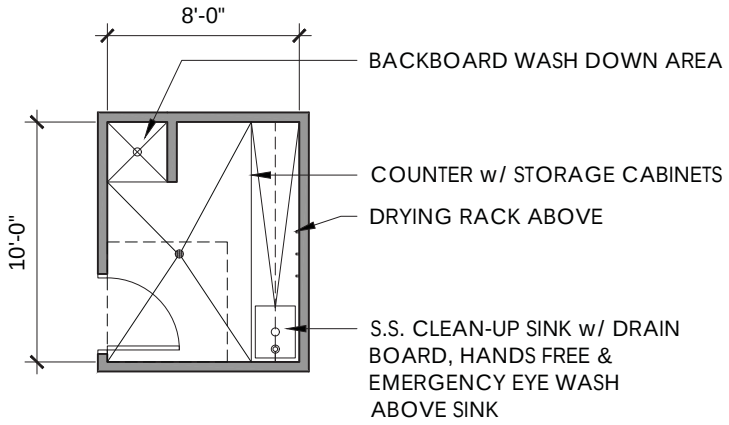


1 - APPARATUS BAY - 2 DRIVE-THROUGH BAYS (2,000 S.F.)

SCALE: 1/16"=1'-0"

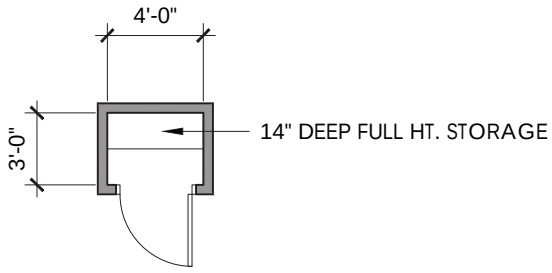
- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - APPARATUS BAY/APPARATUS BAY SUPPORT



2 - MEDICAL CLEAN UP (80 S.F.)

SCALE: 1/8"=1'-0"

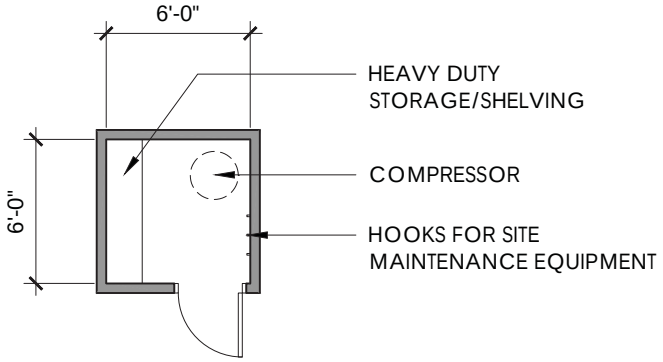


3 - MEDICAL SUPPLY STORAGE (12 S.F.)

SCALE: 1/8"=1'-0"

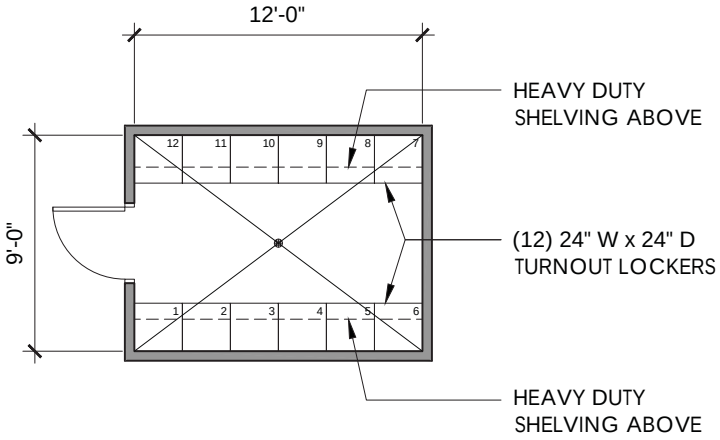
- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - APPARATUS BAY/APPARATUS BAY SUPPORT



4 - YARD STORAGE (36 S.F.)

SCALE: 1/8"=1'-0"

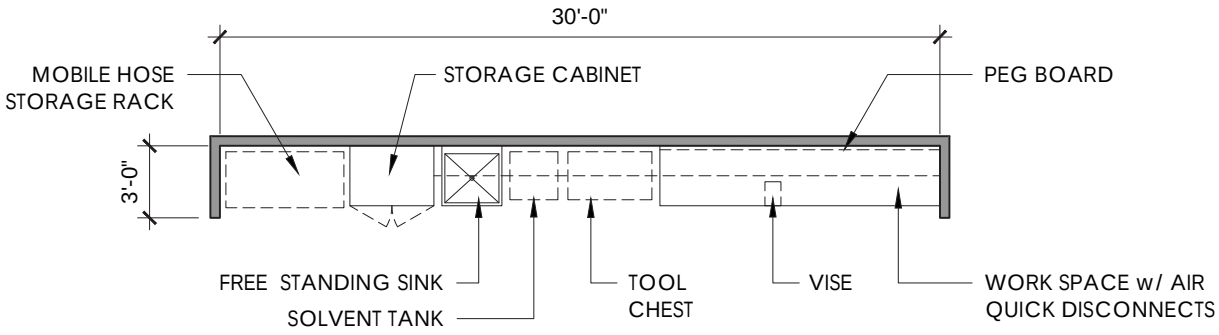


5 - TURNOUT GEAR ROOM (108 S.F.)

SCALE: 1/8"=1'-0"

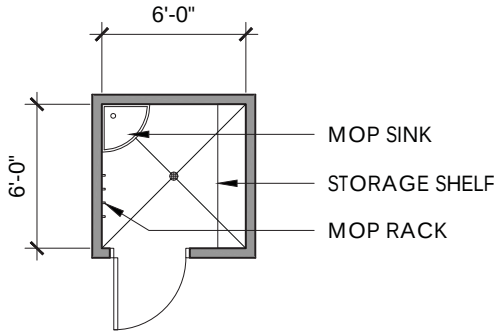
- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - APPARATUS BAY/APPARATUS BAY SUPPORT



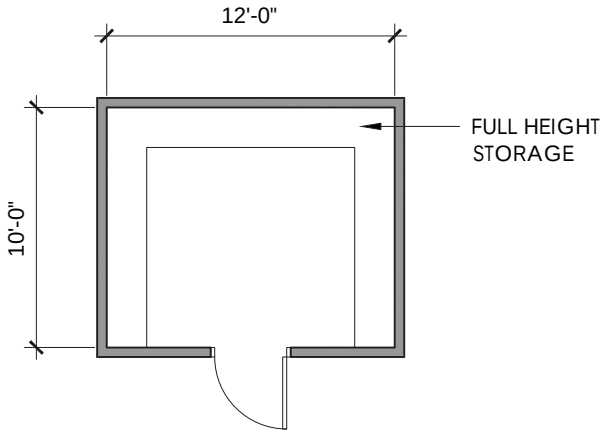
6 - WORKSHOP ALCOVE (90 S.F.)

SCALE: 1/8"=1'-0"



7 - JANITOR ROOM (36 S.F.)

SCALE: 1/8"=1'-0"

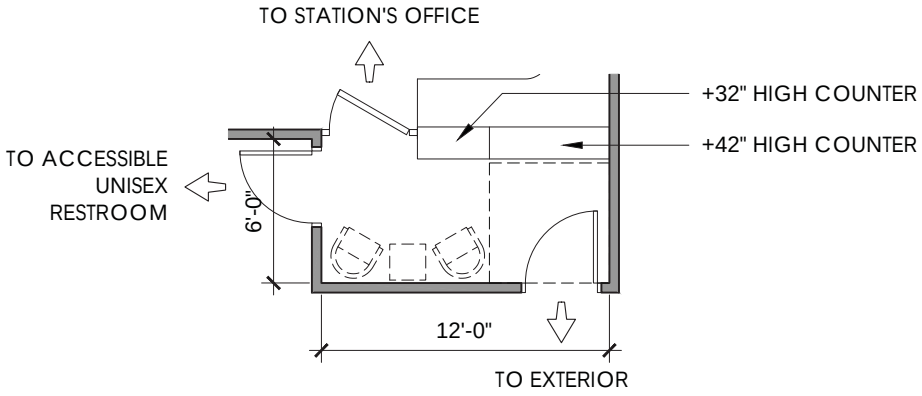


8 - SPECIAL PROJECT ROOM (120 S.F.)

SCALE: 1/8"=1'-0"

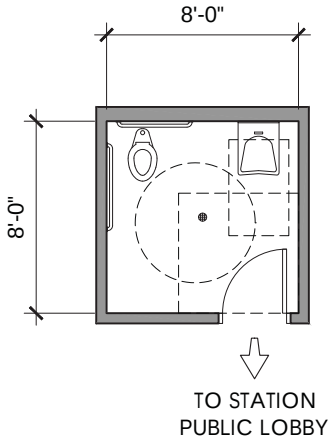
- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - FIREFIGHTER OFFICES



9 - STATION PUBLIC LOBBY (72 S.F.)

SCALE: 1/8"=1'-0"

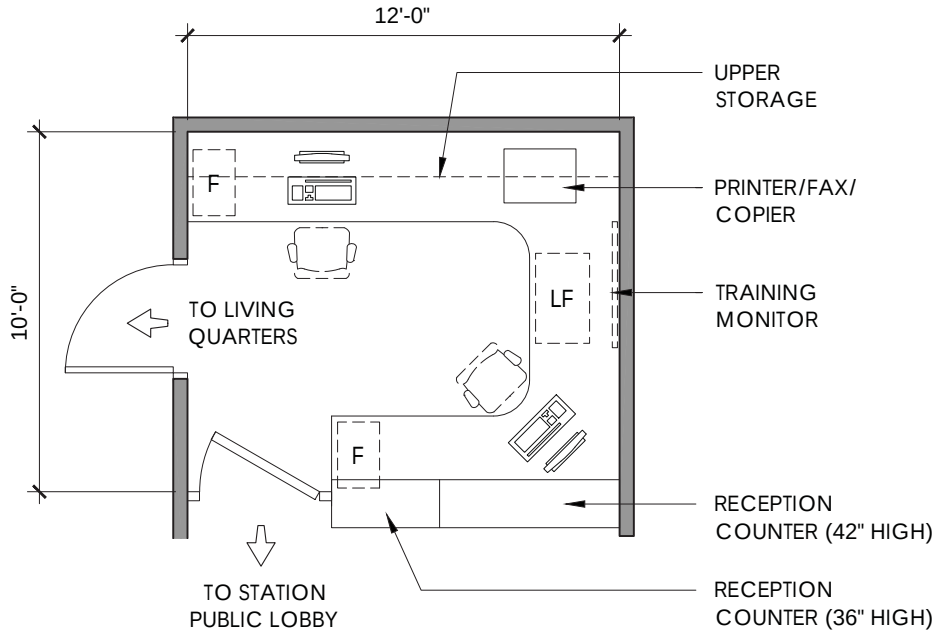


10 - STATION PUBLIC RESTROOM - UNISEX (64 S.F.)

SCALE: 1/8"=1'-0"

- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - FIREFIGHTER OFFICES

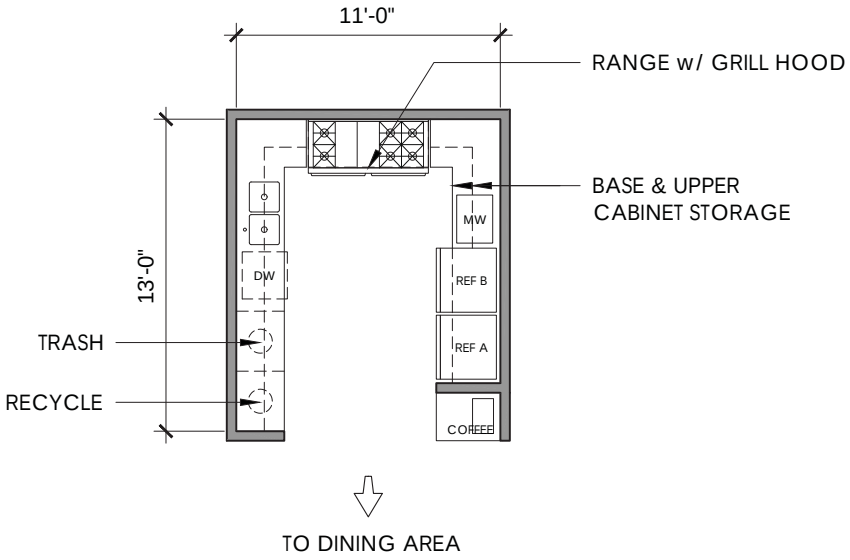


11 - STATION OFFICE (120 S.F.)

SCALE: 3/16"=1'-0"

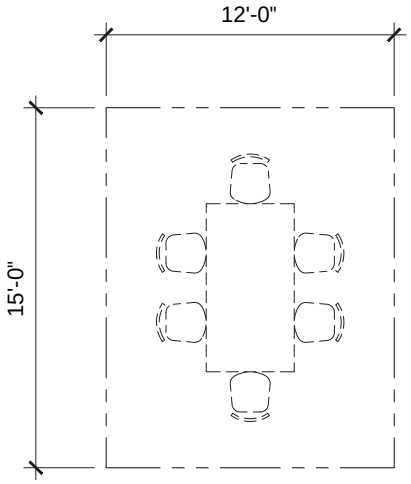
- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - FIREFIGHTER QUARTERS



12 - KITCHEN (143 S.F.)

SCALE: 1/8"=1'-0"

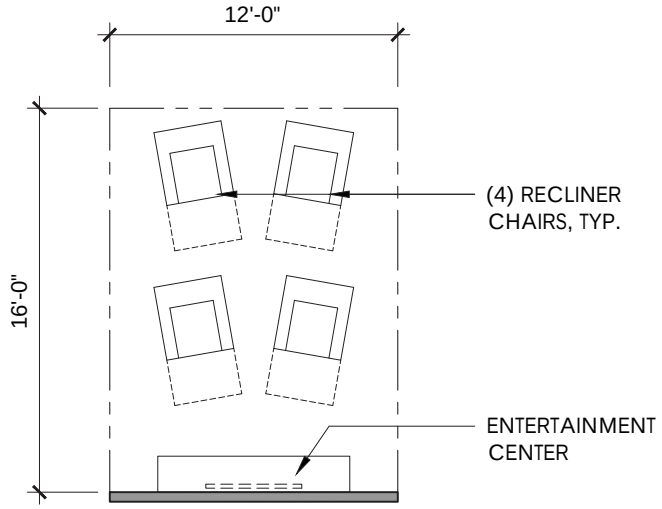


13 - DINING AREA (180 S.F.)

SCALE: 1/8"=1'-0"

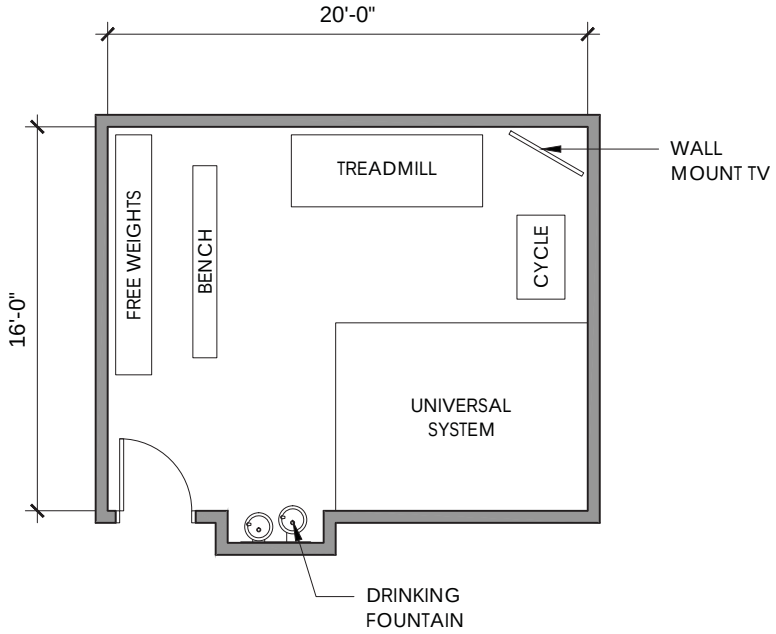
- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - FIREFIGHTER QUARTERS



14 - DAYROOM (192 S.F.)

SCALE: 1/8"=1'-0"

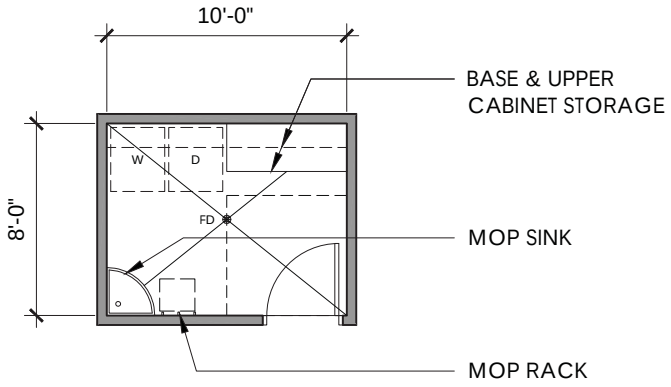


15 - FITNESS ROOM (320 S.F.)

SCALE: 1/8"=1'-0"

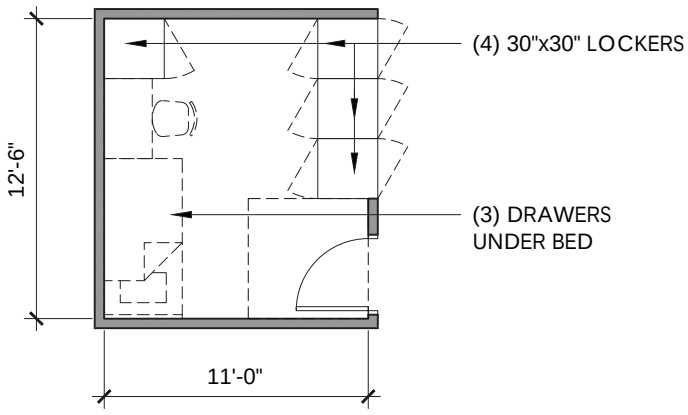
- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - FIREFIGHTER QUARTERS



16 - LAUNDRY ROOM (80 S.F.)

SCALE: 1/8"=1'-0"

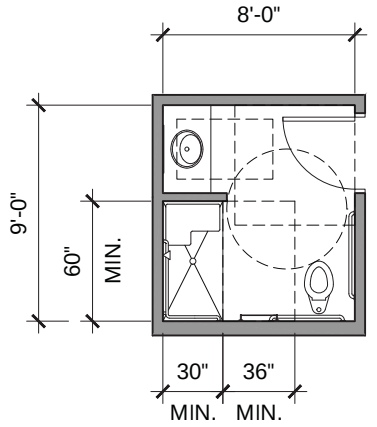


17 - FIREFIGHTER BEDROOM - 4 (550 S.F.)

SCALE: 1/8"=1'-0"

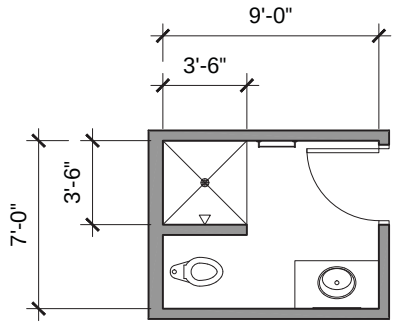
- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - FIREFIGHTER QUARTERS



18 - FIREFIGHTER BATHROOM ADA (72 S.F.)

SCALE: 1/8"=1'-0"

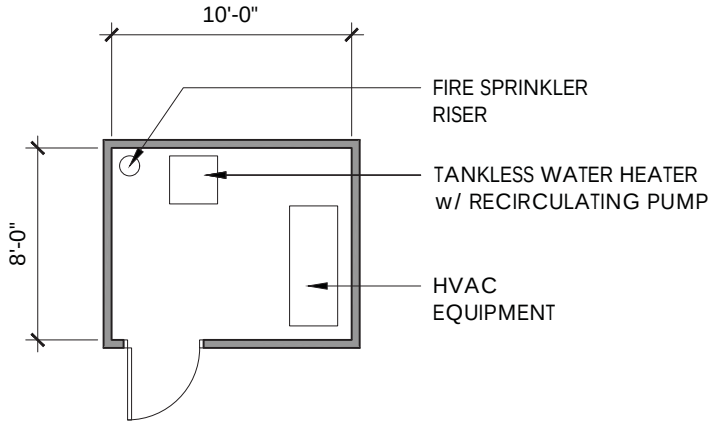


19 - FIREFIGHTER BATHROOM (63 S.F.)

SCALE: 1/8"=1'-0"

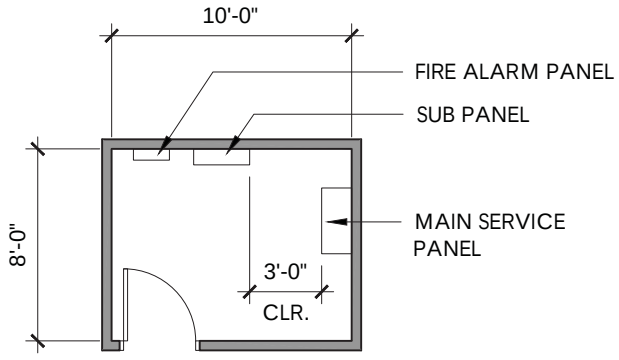
- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - UTILITY SUPPORT SPACE



20 - MECHANICAL ROOM (80 S.F.)

SCALE: 1/8"=1'-0"

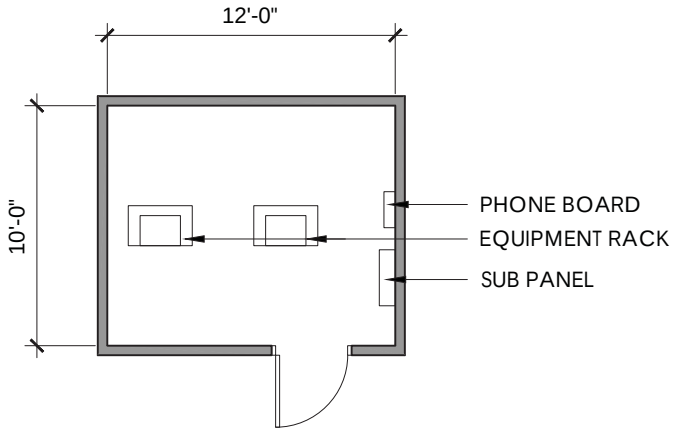


21 - ELECTRICAL ROOM (80 S.F.)

SCALE: 1/8"=1'-0"

- **SINGLE COMPANY STATION PROTOTYPE**

  STATION - UTILITY SUPPORT SPACE



22 - COMMUNICATIONS ROOM (120 S.F.)

SCALE: 1/8"=1'-0"

E. EXISTING FACILITY CONDITION ASSESSMENTS

SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 54 AT 46 CASTRO STREET

SEISMIC AND OPERATIONAL UPGRADE TO FIRE STATION 55 AT 955 Pt. SAN PEDRO ROAD




EXISTING FACILITY ASSESSMENT

FIRE STATION 54 – 46 CASTRO AVENUE

Fire Station 54 is located on Castro Avenue and serves San Rafael's Canal neighborhood. This approximately 4,120-square-foot facility was constructed in 1964 in response to increased commercial and residential growth in this portion of the city. Fire Station 54 is home to the mechanic's workshop, which is a small shed outside the rear of the apparatus bays. This station currently houses Engine 54 and Truck 54. The truck is proposed to be relocated to the new Fire Station 52 providing space in the apparatus bay for reserve apparatus. This is one of the department's smaller stations; however, it only houses three firefighters per shift. With interior reconfiguration and a minor expansion, current operational practices can be accommodated. Recommendations include seismic and exterior enclosure upgrade. A remodeled interior and a minor expansion is proposed to provide private sleeping quarters, a fitness room, dedicated turnout spare, and medical clean-up facilities. Primary deficiencies that would be corrected include:

- Structural system is in need of major seismic upgrade. The apparatus bay requires lateral strengthening and the lower portion of the station requires seismic ties at the roof level. The station has evidence of apparatus bay slab deterioration which would be repaired as new footings are provided as a part of the seismic renovation.

- The heating systems appear to be a part of the original construction and at 50 years old is past its useful service life. There are two inefficient wall air conditioners that were installed to supplement the original heating system.
- The plumbing systems in the building are mostly original and are nearing or are at the end of their service life. The SRFD is performing emergency repairs to the shower to keep them operational until systems are replaced.
- The building is not supported by a fire alarm system and is not protected by fire sprinklers.

FIRE STATION 55 – 955 POINT SAN PEDRO ROAD

Fire Station 55 is located on Point San Pedro Road and serves the Loch Lomond, Glenwood, and Peacock Gap areas of eastern San Rafael, as well as provides backup for Fire Station 52. Fire Station 52 was originally built in 1966 as a mirror image of Fire Station 54, which was constructed just two years earlier. Similar to Fire Station 54, this is one of the department smaller stations; however, it only provides living quarters for three firefighters per shift. With interior reconfiguration and a minor expansion current operational practices can be accommodated. Recommendations include seismic and exterior enclosure upgrade. A remodeled interior and a minor expansion is proposed to provide private sleeping quarters, a fitness room, dedicated turnout spare, and medical clean-up facilities. Primary deficiencies that would be corrected include:

- Structural system is in need of major seismic upgrade. The apparatus bay requires lateral strengthening and the lower portion of the station requires seismic ties at the roof level. The station has evidence of apparatus bay slab deterioration which would be repaired as new footings are provided as a part of the seismic renovation.
- The heating systems appear to be a part of the original construction and at 50 years old is past its useful service life. There are two inefficient wall air conditioners that were installed to supplement the original heating.
- The existing plumbing systems in the building are mostly original and are nearing the end of their service life.
- Lighting systems are mostly original and are inefficient.
- The building is not supported by a fire alarm system and is not protected by fire sprinklers.

Supporting documents used to prepare this recommendation include:

San Rafael Strategic Plan Tier 1 - Fire Stations No. 54 and 55
Structural Review and Conditional Assessment.
Prepared by Cornerstone Structural Engineering Group
Dated: June 23, 2015

Basis of Design Narrative - Fire Stations 54
Basis of Design Narrative - Fire Stations 55
City of San Rafael - Essential Facilities Strategic Plan
MEP Review and Conditional Assessment
Prepared by Interface Engineering
Dated: June 22, 2015

Concept Cost Plan - San Rafael No. 54 - Option 1
Concept Cost Plan - San Rafael No. 55 - Option 1
Prepared by Mack5
Dated: June 22, 2015

APPENDIX

San Rafael Strategic Plan Tier 1 - Fire Stations No. 54 and 55
Structural Review and Conditional Assessment
Prepared by Cornerstone Structural Engineering Group
Dated: June 23, 2015

Basis of Design Narrative - Fire Stations 54
Basis of Design Narrative - Fire Stations 55
City of San Rafael - Essential Facilities Strategic Plan
MEP Review and Conditional Assessment
Prepared by Interface Engineering
Dated: June 22, 2015

Concept Cost Plan - San Rafael No. 54 - Option 1
Concept Cost Plan - San Rafael No. 55 - Option 1
Prepared by Mack5
Dated: June 22, 2015




CORNERSTONE
structural
engineering
group

San Rafael Strategic Plan Tier 1 - Fire Station No. 54 & 55

City of San Rafael
San Francisco, CA

Structural Review and Conditional Assessment FINAL DRAFT

June 23, 2015

Structural Engineering • Construction Services • Engineering Solutions • Project Management

40 Federal Street
San Francisco, CA 94107
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fax (415) 369-9101

CORNERSTONE
structural
engineering
group

www.cseg.com

June 23, 2015
2015014.11

Mary McGrath Architects
505 17th Street, 2nd Floor
Oakland, CA 94612

Attention: Mary McGrath

Subject: San Rafael Strategic Plan – Fire Stations No. 54,55
Tier 1 Structural Assessment of Public Safety Facilities
San Rafael, CA

Dear Mary

Cornerstone Structural Engineering Group would like to present this initial structural assessment report for the subject project. In accordance with our proposal, we have performed a structural review and seismic risk assessment for the existing Fire Station Buildings 54 and 55 in San Rafael. This report contains the evaluations of the one--story cast-in-place concrete and wood frame buildings with shear walls originally constructed in 1964 and 1966 respectively.

We completed a site visit in March 2015, and have reviewed the available structural plans. This review includes a Tier 1 ASCE 31 seismic evaluation for Immediate Occupancy in addition to a conditional assessment of the buildings. The Tier 1 assessment includes a general review of the vertical and lateral systems of the structures.

The following report describes the findings of our structural review and seismic risk assessment for the buildings. We have included information on the performance of the buildings in a code-level earthquake.

Sincerely,
CORNERSTONE STRUCTURAL
ENGINEERING GROUP, INC.

Thomas L. Swayze, S.E.
Principal

40 Federal Street
San Francisco, CA 94107
tel (415) 369-9100
fax (415) 369-9101

TABLE OF CONTENTS

PART 1: INTRODUCTION

The following represents a general structural conditional and seismic assessment of two existing Fire Stations No. 54 and 55 located in San Rafael, California. See below for building descriptions and locations.

Station 54: A single story concrete tilt-up and wood framed structure constructed on conventional spread footings on a flat site on West Railroad Avenue in San Rafael. There are two apparatus bays within the station. The apparatus bay is constructed of the concrete wall construction and the remaining portion of the station is wood framed. The original construction is from 1964.

Figure 1: Station 54 Site Plan

Station 55: A single-story wood framed structure constructed on pile type foundations on a flat site in San Rafael. This station is directly at the bayside across San Pedro Road. There are two apparatus bays within the station. The apparatus bay is constructed entirely of wood framed construction although the floor plan layout is identical to Station 54. The original construction is from 1966.

Figure 2: Station 55 Site Plan

Site visits were performed on March 20, 2015 to observe the existing structural conditions of the two fire station buildings.

The report conclusions are limited by the availability of as-built construction documents and by the level of access possible for the observation of the building. This report describes the findings of our structural review, and provides recommendations for seismic upgrade and conditional structural repairs as applicable.

PART 2: SEISMIC PERFORMANCE EVALUATION

2.1 *Methodology*

The potential damage to a structure in an earthquake can be evaluated provided that, (1) seismic hazards which affect the structure and site can be estimated and, (2) the vulnerability of the structure to those hazards are known or can be estimated.

Seismicity of the fire stations was determined using the United States Geologic Survey (USGS) web based Seismic Hazard Curves, Response Parameters and Design Parameters program. Seismic short period S_S and one second S_1 response acceleration parameters were obtained using latitude and longitude coordinates of the fire station location.

Seismic evaluations of the buildings were conducted using the ASCE 31-03 – Seismic Evaluation of Existing Buildings. The ASCE 31 provides a three-tiered process for seismic evaluation of existing buildings based on building type and the level of seismicity for the building location. The Tier 1 study is an initial checklist evaluation of structural, non-structural and foundation/geologic hazard elements of a building and site conditions that is intended to screen for potential seismic deficiencies. Tiers 2 and 3 studies are more in-depth analysis procedures for a building or component that is identified by the Tier 1 screening process as structurally deficient.

This assessment of the fire station buildings utilizes the Tier 1 screening procedure to identify deficiencies as possible with the information available.

2.2 *Performance Level*

ASCE 31 evaluation of a building can be performed for either Life Safety (LS) or Immediate Occupancy (IO) performance level.

ASCE 31 generalizes the two performance levels as follows:

- LS Performance Level: At least some margin against either partial or total collapse remains, and that the overall risk of life-threatening injury as a result of structural damage is expected to be low.
- IO Performance Level: After an earthquake, the basic vertical and lateral force-resisting systems retain nearly all of their pre-earthquake strength, very limited damage to structural and non-structural components has occurred and that critical parts of the building are habitable.

The fire station buildings were evaluated using the Immediate Occupancy (IO) performance level criteria.

2.3 *Seismic Source*

The general seismicity in the San Francisco Bay Area is influenced by several known faults, their potential faulting length, and relative orientation. The San Andreas Fault system, which separates the North American plate from the Pacific plate, is located approximately 15km west of the fire stations. Other known, nearest-site faults with recorded activity, such as the Hayward Fault are listed in Table 1.

Recent earthquakes in Southern and Central California – namely Coalinga, Whittier Narrows, and Northridge – have occurred along blind-thrust faults. These faults do not have readily identifiable surface features and are not extensively mapped. The potential for strong-ground motion to occur due to blind-thrust faulting in Northern California is somewhat in doubt. However, a moderate to large earthquake centered even closer to the site cannot be completely ruled out.

Distance (km)	San Andreas Fault [Type A]	San Gregorio Fault [Type B]	Hayward Fault [Type A]
Estimated MCE (M_W)	**7.1**	**7.2**	**6.4**
Station 54	16.0	17.2	12.7
Station 55	20.0	20.7	9.0

Table 1: Active Near Source Faults

Based on the 2008 USGS mapping, the 475-year peak ground acceleration (PGA) for the sites are estimated to range from 0.464g to 0.488g. The 475-year earthquake is the design basis for a standard structure in the California Building Code (CBC) and is based on a 10 percent probability of exceedance within a 50 year time frame.

The calculated site specific S_{DS} and S_{D1} response acceleration parameters for the fire station buildings are listed in Table 2 and use a site soil classification per USGS Soil Type and Shaking Hazard in the San Francisco Bay Area Map. Based on S_{DS} and S_{D1} values, ASCE 31 categorizes the seismicity of the fire stations as 'High.'

	Soil Site Classification	S_{DS}	S_{D1}
Station 54	E	0.90	0.96
Station 55	E	0.90	0.96

Table 2: Site Specific Response Acceleration Parameters

2.4 *Liquefaction, Landslide, and other Geologic Hazard*

Currently published California Geological Survey (CGS) liquefaction hazard zone maps do not include this part of California yet. According to the Association of Bay Area Governments Earthquake Liquefaction Susceptibility maps, the fire stations are located within a 'Very High' zone for liquefaction, see Figure 5 and 6. Liquefaction is the loss of bearing strength of saturated, cohesionless soils under strong ground motions, which can cause building settlement by consolidation of soils susceptible to liquefaction. Based on the hazard maps and a cursory knowledge of the soils in the area, the potential for liquefaction due to strong ground motions at stations 54 and 55 is considered to be high.

Fire station No. 54 is situated on a developed area. The potential for seismically induced landslide is therefore considered to be minimal. Fire Station 55 is constructed at the base of a steep hill which might present a risk of a seismically induced landslide. Currently published CGS maps for landslide vulnerability do not include this area yet.

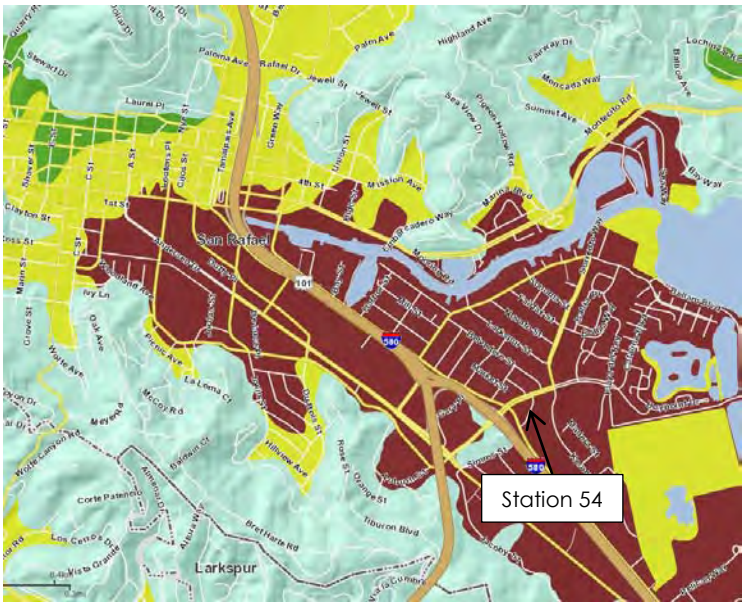


Figure 3: Association of Bay Area Governments Earthquake Liquefaction Susceptibility Map – Very High (Maroon)

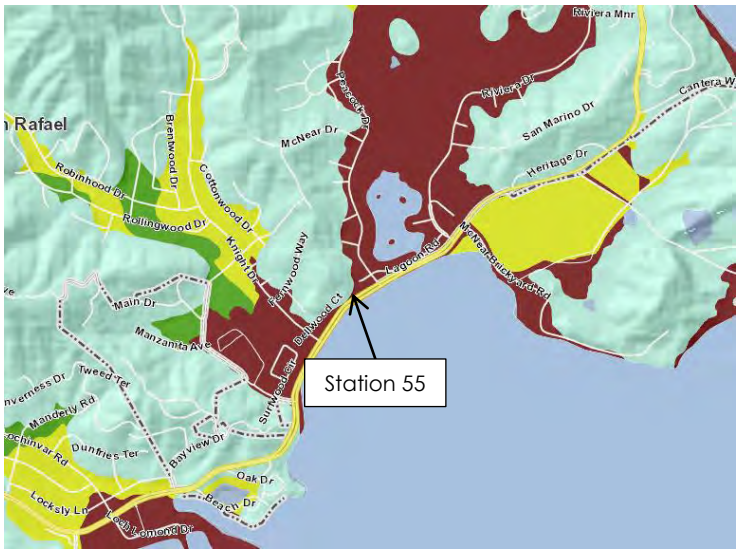


Figure 4: Association of Bay Area Governments Earthquake Liquefaction Susceptibility Map – Very High (Maroon)

The fire stations are not located within a Special Study Zone as defined by the Alquist-Priolo Earthquake Fault Zoning Act. The potential for surface fault rupture is considered to be low.

It should be noted that a more thorough explanation of site seismicity, liquefaction and specific faulting hazards should be provided by a geotechnical engineer. The conclusions above rely on general USGS & CGS published data for the San Francisco Bay Area.

PART 3: STRUCTURAL EVALUATION

3.1 *Evaluation*

An ASCE 31 Tier 1 seismic evaluation of the two fire stations was performed using the Immediate Occupancy performance level. The buildings were evaluated for Basic Structural (Sec. 3.7), Supplemental Structural (Sec. 3.7S) and Geologic Site Hazard and Foundation (Sec. 3.8) checklists. This report does not evaluate the buildings for the Nonstructural (Sec. 3.9) checklist, which is typically performed by an Architect or other qualified professional.

3.2 *Documentation*

Available records or as-built drawings for the fire station include:

Station 54:

- The architectural, structural and electrical construction drawings for the fire station building by Roger F. Hooper and Associates from San Francisco. Sheets 1-8 of 8, with additional sheets 1 and 2 that are undated. Sheets 1-8 are dated March 17, 1964. Structural Engineer of record appears to be Whitlow, Hoffman, and Albritton Civil and Structural Engineers from San Rafael.

Station 55:

- The architectural, drawings for the fire station building by Hooper, Olmsted & Emmons Architects from San Francisco. Sheets A1-A4, that are dated March 7, 1966.
- The structural drawings for the fire station building sheets S1 and S2 by Whitlow, Hoffman, and Albritton Civil and Structural Engineers from San Rafael. The structural drawings bear the same date as the architectural plans.

The information provided within this report regarding the buildings is based on field observation and review of available as-built drawings.

3.3 *Vertical Load Systems*

Station 54:

- The apparatus bay high roof is a gable roof and is constructed of 3/8 inch plywood sheathing over 2x8 T&G straight planks spanning 3 feet between 6x8 timber purlins (rotated) in turn spanning between welded steel bents spanning 32 feet across the apparatus bay at approximately 11.75 feet spacing. The wall framing around the apparatus bay consists of 6 inch thick tilt-up concrete wall panels interconnected by cast-in-place concrete columns at the steel bents. The concrete panels and columns are supported on conventional shallow spread footings.
- The low flat roof over the living quarters consists of 3/8 inch plywood sheathing over 2x wood joists at 16 inches supported in turn by interior wood framed bearing walls. The wall construction consists of typical wood framed bearing walls around the low roof with conventional shallow spread footing foundations. The apparatus bay slab on grade is 6 inches thick and the living quarters slab is 4 inches thick.

Station 55:

- The apparatus bay high roof is a gable roof and is constructed of 3/8 inch plywood sheathing over 2x8 T&G straight planks spanning 3 feet between 6x8 timber purlins in turn spanning between welded steel bents spanning 32 feet

across the apparatus bay at approximately 11.75 feet spacing. The wall framing around the apparatus bay consists of conventional wood framing with 6x8 wood columns at the steel bents. Walls and columns are supported by an 11 inch thick suspended structural concrete slab spanning between an interior concrete grade beam and perimeter grade beams supported on a combination of drilled concrete piers and driven timber piles. It appears that all of the deep foundation elements on the "bay" side of the structure are driven piles.

- The low flat roof over the living quarters consists of 3/8 inch plywood sheathing over 2x wood joists at 16 inches supported in turn by interior wood framed bearing walls. The wall construction consists of typical wood framed bearing walls around the low roof area. Walls are supported by an 8 inch thick suspended structural concrete slab spanning between an interior concrete grade beam and perimeter grade beams supported on driven timber piles. It appears that all of the deep foundation elements on the "bay" side of the structure are driven piles.

3.4 *Lateral Load System*

Lateral loads acting on the fire station buildings result from either wind pressure or earthquake-induced inertia forces acting on structural and non-structural elements. Lateral loads acting on the structure are transferred through flexible roof and floor diaphragms to the primary lateral-force resisting system of the structure. The primary lateral-force resisting systems consist of the following systems:

Station 54:

- Apparatus bay roof and low roof diaphragms are constructed of 3/8 inch plywood sheathed diaphragms spanning horizontally to conventional plywood sheathed wood shear walls at the low roof which transfer lateral loads down to the continuous concrete spread footings through cast-in-place anchor bolts. The high bay walls are tilt-up concrete walls that transfer in-plane loads through dowels into the continuous perimeter spread footings.

Station 55:

- Apparatus bay roof and low roof diaphragms are constructed of 3/8 inch plywood sheathed diaphragms spanning horizontally to conventional plywood sheathed wood shear walls which transfer lateral loads down to the continuous concrete grade beams through cast-in-place anchor bolts. Grade beam shear is ultimately resisted by pile bending, friction, and passive soil pressure.

3.5 *Conditional Review*

Based on our review, the fire station buildings appear to be in general compliance with the codes and standard construction practices in effect at the time of their construction. The exterior, interior, and portions of the roof of the fire station were observed during the site visit on March 19-20, 2015. Based on our cursory observations, the buildings appear to be in overall good condition, except for the following specific conditions as noted (see Appendix for photos referenced):

Station 54:

- There is evidence of apparatus bay slab deterioration at the front lip adjacent to the apron slab. (See Photo 2)
- Roof overhangs appear to need re-painting. Primary outriggers appear to still be in good condition, but the 2x decking shows extensive dry rot on the north side of the building at the soffit. (See Photo 3)

- Minor differential settlement cracking was noted in the rear concrete panel at the back of the apparatus bay. (See Photo 4)
- The site may have experienced overall soil consolidation beneath the building footprint, as the paving areas behind the station are noticeably higher than the floor slab, creating an undesirable drainage condition (See Photo 5)

Station 55:

- There is evidence of apparatus bay slab grinding at the front lip adjacent to the apron slab, to facilitate the transition to the apron as it settles. (See Photo 7)
- Roof overhangs appear to need re-painting. Primary outriggers show weather damage and the 2x decking shows extensive dry rot on outer edge of the eaves all around at the soffit. (See Photos 8 & 9)
- Minor slab cracking was noted in the suspended slab of the apparatus bay. (See Photo 10)
- The site may have experienced overall soil consolidation beneath the building footprint, as the site walks around the station behind the station are noticeably distorted (See Photo 11)

3.6 *Seismic Evaluation Findings*

Based on the ASCE 31 Tier 1 review, the following items are of significance for the performance of the building when subjected to strong ground motions during an earthquake.

Station 54:

Positive Features

- Low rise mostly wood framed structures are relatively lightweight and historically perform well in seismic events.
- Both roof diaphragms have plywood sheathing.
- Wood framed exterior walls have plywood sheathing.
- Concrete tilt-up walls have significant in-plane strength.

Negative Features

- Project site is located within an identified liquefaction zone and there are no special provisions in the foundation system. The overall building appears to have settled.
- The front wall of the concrete apparatus bays has inadequate shear walls in the transverse direction. The foundations for these walls are inadequate for seismic overturning.
- The north wall of the apparatus bay is completely open between the building columns with a row of clerestory windows. There is inadequate shear resistance in this plane and the columns do not have sufficient strength to transfer diaphragm loads to the low roof diaphragm.
- There is a lack of roof-to-wall ties for the concrete panels under out-of-plane seismic forces.
- There is an out of plane panel stability issue below the clerestory windows in the apparatus bay for out of plane seismic forces at panels with openings.

- There exists a split-level diaphragm between the high roof and the low roof above the offices and other areas. This effectively splits the building in multiple parts and presents vulnerability for separation at this joint where the roof step occurs. Existing wall ties transfer seismic forces through cross grain bending in the existing low roof ledger which is prohibited.
- There do not appear to be any hold-downs for the wood framed walls.
- There is a lack of roof to-wall ties at re-entrant corners.

Station 55:

Positive Features

- Low rise mostly wood framed structures are relatively lightweight and historically perform well in seismic events.
- Both roof diaphragms have plywood sheathing.
- Wood framed exterior walls have plywood sheathing.

Negative Features

- Project site is located within an identified liquefaction zone.
- The front wall of the apparatus bays has inadequate shear walls in the transverse direction.
- There exists a split-level diaphragm between the high roof and the low roof above the offices and other areas. This effectively splits the building in multiple parts and presents vulnerability for separation at this joint where the roof step occurs.
- There is a lack of roof to-wall ties at re-entrant corners.

PART 4: CONCLUSION AND RECOMMENDATIONS

4.1 *Expected Performance*

Findings within this report provide a general structural conditional and seismic assessment of the existing buildings of the San Rafael Fire Stations No. 54 and 55 located at 46 Castro Ave. and 955 Point San Pedro Rd. in San Rafael, CA. Our evaluation concludes that the buildings fail to meet full compliance for ASCE 31 Tier 1 Immediate Occupancy performance criteria.

The following structural relative performance descriptions are based on our professional engineering judgment and experience, and are not part of the ASCE 31 Tier 1 checklist. These descriptions are included to provide a general estimation of seismic performance of the structure, based on component evaluations provided by the Tier 1 evaluation procedure. We expect the building to perform as follows:

- The buildings are anticipated to perform below average in comparison to buildings of similar construction when subjected to a design level earthquake, due to overstressed shear walls, discontinuous shear walls, lack of hold downs, and geometric irregularities.

4.2 *General Recommendation for Conditional Issues*

The following recommendations are provided to address issues concerning the condition of the existing fire station buildings. While none of these represent immediate life safety

issues; it is recommended that these issues be addressed in the near future to prevent further deterioration from occurring:

Station 54:

- The front edge of the apparatus bay slab to apron interface should be removed and reconstructed.
- Water damaged decking at overhangs should be removed and replaced.
- Exterior overhangs should be re-painted
- Rear portion of site should be re-graded to allow positive drainage

Station 55:

- The front edge of the apparatus bay slab to apron interface should be removed and reconstructed.
- Water damaged decking at overhangs should be removed and replaced. Reduction of the overhang length should be considered to allow damaged ends to be trimmed off.
- Exterior overhangs should be re-painted
- Flatwork around site should be removed and replaced

4.3 *Seismic Recommendations*

The following qualitative recommendations are provided to address our opinion of the potential remediation options for identified seismic deficiencies. These methods are based on our evaluations described elsewhere in this report and engineering judgment. While the recommendations listed below do not represent any immediate concerns that warrant facility closure, they do describe building components that are non-compliant per the ASCE 31 Tier 1 checklist review for Immediate Occupancy performance or as identified by conditional or systemic deficiencies. We recommend these repairs and seismic upgrades are programmed into a future project:

Station 54:

- Enhance the existing plywood shear walls as necessary to make up for deficient shear capacity. Similarly enhance sill bolting connection as necessary.
- Provide a collector tie and vertical column strong-back at front and back ends of apparatus bay along the roof plane elevation discontinuity to provide continuity across the split-level diaphragms so that seismic load can be delivered to shear walls as they occur.
- Install new collectors in low roof
- Re-sheathe high roof with new plywood. Install new hold-downs and new footing supplements at existing shear walls at the ground floor slab/foundation level
- Provide new shotcrete infill panel at 2 clerestory windows.
- Provide horizontal strong-back at concrete panels with clerestory windows where panel openings occur.
- Provide roof-to-wall tie enhancement at concrete wall to roof interface
- Provide exterior shear buttress at front wall of apparatus bay.
- Provide footing replacement at front wall of apparatus bay
- Obtain geotechnical assessment of liquefaction potential and possible mitigation if necessary.

Station 55:

- Enhance the existing plywood shear walls as necessary to make up for deficient shear capacity. Similarly enhance sill bolting connection as necessary.
- Provide a collector tie at front and back ends of apparatus bay and a vertical column strong back at the back end of the apparatus bay along the roof plane elevation discontinuity to provide continuity across the split-level diaphragms so that seismic load can be delivered to shear walls as they occur.
- Install new collectors in low roof
- Install new hold-downs at existing shear walls at the ground floor slab/foundation level
- Obtain geotechnical assessment of liquefaction potential and possible mitigation for new flatwork or additions as necessary.

PART 5: APPENDIX - PHOTOS

Photo 1: Station 54, Exterior of the Building

Photo 2: Station 54, Slab Deterioration

Photo 3: Station 54, Dry Rot in Roof Decking

Photo 4: Station 54, Differential Settlement Cracking in App Bay

Photo 5: Station 54, Possible Soil Consolidation

Photo 6: Station 55, Exterior of the Building

Photo 7: Station 55, Slab Grinding at Front Lip

Photo 8: Station 55, Dry Rot in Roof Decking

Photo 9: Station 55, Dry Rot in Roof Decking

Photo 10: Station 55, Minor Slab Cracking in App Bay

Photo 11: Station 55, Possible Soil Consolidation

Basis of Design Narrative - Fire Station 54

City of San Rafael - Essential Facilities Strategic Plan
2015-0131

prepared for:
Mary McGrath Architects

prepared by:
Eunice Yoon, PE, LEED AP, BD+C
Jared Doescher, PE, LEED AP
Jason Lau, PE, LEED AP
Thomas de Senna, PE

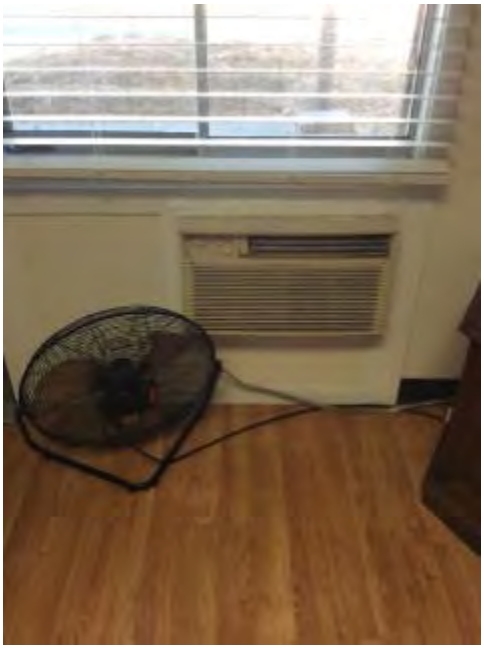
June 22, 2015

INTERFACE ENGINEERING

Assessment of Current City of San Rafael Essential Facilities Fire Station #54

- **Mechanical Assessment**

  Fire Station #54 is a single story building with attached apparatus bay built in 1964. The gas furnace seems to be part of the original installation and is located in a small mechanical room, with louvered doors, accessible from the outside of the building. The gas furnace provides heating to the living quarters and ventilation is provided with operable windows. The dormitory and the office areas have packaged terminal air conditioning (PTAC) units installed through the walls for cooling. The existing gas furnace is antiquated and has exceeded the recommended useful life. The two PTAC units are in fair condition and have approximately 5 years remaining useful life. The HVAC system for this building with the central furnace and PTAC units are not adequately sized to provide necessary cooling and heating. The Toilet and Shower room are provided with ceiling mounted exhaust fans on a dial timer switch. The exhaust fans serving this room seem to be working properly and may have 5 years of life remaining.



  The Apparatus Bay portion of the building has no cooling system and has gas unit heaters mounted close to the roof. The engine exhaust duct system seems to be working properly and well maintained. The exhaust fan for the engine exhaust system has approximately 5 years of useful life.

- **Plumbing Assessment**

  The existing piping systems in the building are mostly original and are nearing the end of their service life.

  The sewer lateral from the building flows to a city main in Castro Avenue. We were unable to verify the size or assess the condition of the underground and below slab piping.

A small sump pump is located outside at the south end of the building. The pump discharge piping is routed above grade, and is strapped to a fence at the property line. The discharge pipe material appears to be unpainted ABS, which is not rated for pressure applications or exposed outdoor installations. We were unable to verify the condition of the pump.

Roof drainage is by gutters and downspouts and spills to grade. In several locations, downspout outlets have been diverted away from the building with corrugated plastic pipe. Several of the downspouts are damaged or corroded.

The building is served by a 1" water meter located in the curb at Castro Avenue. A PRV and backflow preventer are installed at the point of connection to the building. These components and piping appear to be in functional condition. We were unable to assess the condition of the underground piping. Hot water is supplied from a gas fired water heater, installed in 1992. The domestic hot water system is uncirculated.

The existing bathroom plumbing fixtures are original, non-water conserving fixtures.

Natural gas service enters at the southwest corner of the building. It runs overhead in the truck bay, attached directly to the structure, and above ceiling to serve the truck bay heaters, water heater, furnace, laundry dryer, kitchen range, and outdoor grill. The natural gas piping appears to be in functional condition.

- **Electrical Assessment**

Fire Station #54 is currently served by a single PG&E service. Power is derived from an overhead PG&E pole outside the fire station via overhead power lines to a meter and main disconnect switch located in the Apparatus Bay. The PG&E meter number is #5000008388. The main service disconnect switch is rated at 200A, 120/240V, 1-phase, 3-wire. The main disconnect switch feeds to a manual transfer switch, which has a power cord with a receptacle plug to serve a portable emergency generator. The transfer switch appears to have two output feeders that feed the following:

- Load Center (125A, 120/240V, 1-phase, 3-wire with 8 poles). Located in Apparatus Bay. Load center is utilizing residential style tandem breakers. Manufacturer is by General Electric. Appears antiquated and near end of manufacturer's recommended design life.

- Panel "A" (225A, 120/240V, 1-phase, 3-wire with 42 poles). Located in closet of Office. There are (6) single pole spaces available within the panelboard. Manufacturer is by Square D. Appears antiquated and approximately 50 years old. Existing location does not allow for Code-minimum working clearances.

Emergency power is derived from a portable diesel-engine generator. The generator is a Honda EB10000 rated at 9.0kVA, 120/240V, 1-phase, 3-wire with a 8 hours fuel tank capacity at full load. The generator plugs into the receptacle cord outlet coming from the manual transfer switch.

Existing lighting system appears to be part of the original construction in the building, consisting of fluorescent and incandescent luminaires. Fluorescent luminaires consist of striplights with (2)-32 watt T8 lamps in the Apparatus Bay. Incandescent downlights were located within the office and living quarters of the building. Luminaires appeared in poor condition, with missing lenses for several downlights. Toggle switches controlled the majority of the luminaires. There does not appear to be automatic lighting shutoff for the building, only contactors for control of outdoor lighting. The outdoor lighting consists of fairly new LED floodlights.

The existing building is not supported by a fire alarm system. There are individual battery-operated smoke detectors located within the living quarters. No smoke detectors were observed in the Apparatus Bay Building. The new building will require an addressable fire alarm system.

- **Telecommunications Assessment**

  Telecommunication service for the fire station terminates to a telephone backboard located in a closet within the office. Security equipment and other low voltage equipment enclosures are located within the closet and mounted on the plywood backboard.

  There is a communications equipment cabinet located in the Apparatus Bay. It appears to contain equipment serving a public address speaker system. Antenna cables are routed out of the cabinet and up to the exterior roof.

Recommendation for New City of San Rafael Essential Facilities Fire Station #54

- **Option 2 HVAC System Description**

  VRF/HR with Fan coils to provide space heating & cooling.

  Commercial VRF Condensing Units: Provide outdoor and indoor VRF system as described in Option 1.

  Apparatus Bay: Existing gas unit heaters will be reused to provide heating and roll up doors will provide ventilation to the space.

  Commercial Kitchen: Existing kitchen hood and exhaust fan will be reused.

  Residential Laundry room: Provide as described in Option 1.

  Bathroom Exhaust System: Existing ceiling mounted exhaust fans for Restroom/Shower Room shall remain.

  Control System: Provide as described in Option 1.

- **Option 2 Plumbing System Description**

  Sanitary Sewer and Vent System: Provide the following:

  - Scope all existing below and above grade waste piping to the point of connection to the city sewer in Castro Avenue. Replace or repair all damaged piping.

- New waste and vent piping to all new and relocated plumbing fixtures such as water closet, lavatory, tub/shower, washing machine, janitor mop sinks, floor drain and sinks, indirect waste receptors, and other fixtures. Reuse existing rough ins where possible.
- Pipe condensate from mechanical equipment to indirect receptors.

Storm Drainage System:

- Replace damaged gutters and downspouts.
- Relocate gutters and downspouts and correct site grading as needed to properly conduct storm drainage away from the building and toward site storm drains and catch basins.

Domestic Water System:

- Replace all existing below grade domestic water piping from the point of connection at the water meter. Replace any damaged or corroded existing above grade domestic water piping. Replace any existing galvanized steel domestic water piping with copper.
- Provide new domestic CW and HW to any new or relocated fixtures. Reuse existing rough-ins where possible. New fixtures may include the following:
    - Bathroom fixtures (water closets, urinals, lavatories, and showers)
    - Washing machine box
    - Janitor mop sinks
    - Trap primers(CW only) to serve floor drains
    - Mechanical equipment requiring make-up water with backflow device.
    - Hose bibs
- Provide a reduced-pressure type backflow preventer or acceptable equivalent per Water Department requirement.
- Provide a new gas fired domestic water heater and circulating pump.
- Provide irrigation water to landscaping as required.

Plumbing Fixtures:

- Provide all new plumbing fixtures as follows:
    - Water closets: Wall-hung with 1.28 gallons per flush, flush valves
    - Urinals: Wall-hung with 1/8 gallon per flush, flush valve
    - Private Lavatories: Wall hung or counter mounted fixture with 1.0 gpm faucet
    - Public lavatories: Wall-hung or counter-mounted fixture with 0.5 gpm faucet
    - Shower: 1.8 gpm shower head.

- Provide interior and exterior hose bibs with vacuum breakers.
- New floor drains and floor sinks, with trap primers, where indicated. Locate trap primer where accessible or in-wall with access panel. Reuse existing floor fixtures that are in good condition.

Natural Gas: Provide the following:

- Inspect all existing natural gas piping and replace any damaged or corroded piping. Reuse existing piping that is in good condition.

- Provide natural gas to all gas fired appliances such as heaters, furnaces, water heaters, ranges, and dryers utilizing existing piping and routing when possible.

Piping Materials: Provide all new materials as follows:

- Sanitary sewer (SS) and vent system: Service weight no-hub cast iron soil pipe and fittings with standard couplings above ground and heavy weight cast iron soil pipe and fittings with heavy-duty couplings below ground. Provide corrosion protection for below grade piping as recommended by Geotechnical Engineer.
- Potable domestic cold water (CW) system: Type L hard drawn copper tube above ground; Type K hard drawn copper tube below ground.
- Potable domestic hot water (HW) system: Type L hard drawn copper tube aboveground.
- Natural Gas System:
  - Above ground: Schedule 40, A53 black steel pipe and threaded malleable iron fittings. Galvanized steel for piping exposed to weather.
  - Below ground: Schedule 40, A53 black steel pipe and threaded malleable fittings 2-1/2 inches and smaller. Welded pipe 3 inches and larger. Pipe below grade wrapped with double thickness Scotchwrap No. 51 applied over Scotchwrap pipe primer. Factory applied epoxy coating to equivalent thickness with field wrapped or epoxied joints approved. Alternately, Polyethylene piping with tracer wire to meet CPC.

Condensate Drain System: Type M copper tube with solder joints.

- **Option 2 Electrical System Description**

Service Capacity: If the existing demand load can be verified by PG&E to be significantly less than the rated capacity of existing service, it may be possible to keep the existing PG&E service and just replace the antiquated electrical distribution equipment.

New Generator System: In order to reduce cost on the project, it is recommended to size the emergency generator to support only Code-required standby loads, in lieu of the whole fire station. The emergency generator, automatic transfer switch, and emergency panelboard would be reduced as a result.

Site Lighting: Keep existing exterior lighting.

Interior Lighting: Remove option for tap-out system.

Power Distribution: Provide as described in Option 1.

- **Telecommunication System Description**

Incoming cable terminations shall remain in the same location if the location of the telephone backboard does not change. Otherwise, the cable terminations shall be relocated to a new location such as a new IT room. ¾-inch by 4-foot by 8-foot fire rated plywood backboards will be provided on every wall in the IT room. The IT room will have a telecommunications ground bus bar with a #3/0 copper ground to the main electrical panel and to building steel. Termination blocks will be wall mounted and will cross-connect with the PBX switch and distribute dial tone throughout the facility.

Metallic 2-gang outlet boxes with single gang adapters with 1 inch metallic conduit/raceways to accessible ceiling space will be provided for routing and termination of voice, data and CATV cabling. Telecom locations will be based on Owner input. Raceway installed per ANSI/TIA/EIA-569-B standards.

Electronic card key access will be provided at identified entry doors and any site gates that are secure. All exterior doors will be monitored via door position switches and CCTV. A keypad with and LCD display will be provided at the main entrance for arm/disarm operation as well as determining which doors are operational or not.

Metallic single-gang outlet boxes with ½ -inch metallic conduit/raceways to accessible ceiling space will be provided for routing and termination of the security/access control cabling. Security/access control locations will be based on Owner input. Raceway installed per ANSI/TIA/EIA-569-B standards.

The paging system will be designed to provide program distribution and all-call to speakers throughout and provide local amplification. Coverage will be included for the entire interior of both buildings as well as exterior areas as designated by the Owner. The system will be required to be interfaced to the telephone system for general paging from any telephone instrument.

One inch metallic conduit/raceways will be provided for routing and termination of the Paging System. Speaker and volume control locations will be based on Owner input. Raceway installed per ANSI/TIA/EIA-569-B standards.

The existing communication equipment cabinet shall be coordinated with the Owner to determine whether it should be reused as part of the renovation.

Electrical Appendix

Figure E1: Incoming Electrical Service Equipment

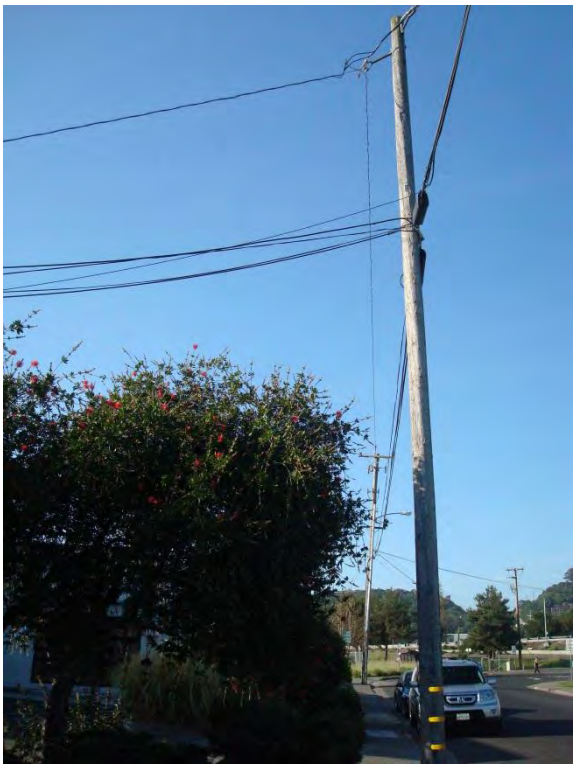


Figure E2: PG&E Utility Pole to Fire Station

Figure E3: Typical Low Voltage Equipment Cabinet

Figure E4: Load Center in Apparatus Bay

Figure E5: Branch Circuit Panelboard `A' in Office Closet

Mechanical Appendix

CITY**MULTI**® Model: 10-TON PURY-P120YKMU-U (-BS)

Job Name:

Schedule Reference: | Date:

OUTDOOR VRF HEAT PUMP WITH HEAT RECOVERY SYSTEM FEATURES

- Assembled in USA
- INVERTER-driven compressor
- Air-source, simultaneous cooling and heating
- Long line lengths - for details see Engineering Manual
- Connects to CITY MULTI indoor units
- Controlled via CITY MULTI Controls Network

UNIT OPTION

- ☐ Standard Model……PURY-P120YKMU-U
- ■ Seacoast (BS) Model……PURY-P120YKMU-U-BS

OPTIONAL PARTS

- ☐ Joint Kit……for details see Pipe Accesories Submittal
- ■ BC Controller……for details see BC Controller Submittals
- ☐ Low Ambient Kit ……for details see Low Ambient Kit Submittal
- ☐ Snow/Hail Guards Kit……for details see Snow/Hail Guards Kit Submittal

Specifications		Model Name
Unit Type		PURY-P120YKMU-U (-BS)
Nominal Cooling Capacity (460V)	Btu/h	120,000
Nominal Heating Capacity (460V)	Btu/h	135,000
Operating Temperature Range *1	Cooling (Outdoor) *2	23~115° F (-5~46° C) DB
	Heating (Outdoor)	-4~60° F (-20~15.5° C) WB
External Dimensions (H x W x D)	In. (mm)	64-31/32 x 68-29/32 x 29-5/32 (1,650 x 1,750 x 740)
Net Weight	Lbs. (kg)	743 (337)
External Finish		Pre-coated galvanized steel sheet
Electrical Power Requirements	Voltage, Phase, Hertz	460V, 3-Phase, 60Hz
Minimum Circuit Ampacity (MCA)	A	21
Maximum Fuse Size	A	25
Piping Diameter (Brazed) (In. / mm)	Liquid (High Pressure)	3/4 (19.05) Brazed
	Gas (Low Pressure)	1-1/8 (28.58) Brazed
Max. Total Refrigerant Line Length	Ft.	1,969
Max. Refrigerant Line Length (Between ODU & IDU)	Ft.	541
Max. Control Wiring Length	Ft.	1,650
Indoor Unit	Total Capacity	50~150% of outdoor unit capacity
	Model / Quantity	P06~P96/1~30
Sound Pressure Levels	dB(A)	60
Fan		
Type x Quantity		Propeller fan x 2
Airflow Rate	CFM	11,300
External Static Pressure	In. WG	Selectable; 0, 0.12 or 0.24"WG; factory set to 0"W.G.
Compressor Operating Range		15% to 100%
Compressor Type x Quantity		Inverter scroll hermetic compressor
Refrigerant		R410A x 26 lbs + 1 oz (11.8 kg)
Protection Devices	High Pressure	High pressure sensor, High pressure switch at 4.15 MPa (601 psi)
	Inverter Circuit (Comp. / Fan)	Over-current protection
	Fan Motor	Thermal switch
AHRI Ratings (Ducted/Non-Ducted)	EER	11.7 / 12.2
	IEER	18.6 / 20.8
	COP	3.45 / 3.61
Simultaneous Rating (Ducted/Non-Ducted)	SCHE *3	16.80 / 19.70
Blue Fin Anti-corrosion Protection: Cellulose- and polyurethane-resin coating treatment applied to condenser coil that protects it from air contaminants **Standard:** ≥1µm thick; Salt Spray Test Method - no unusual rust development to 480 hours. **Seacoast (BS):** ≥1µm thick; Salt Spray Test Method - no unusual rust development to 960 hours.		

NOTES:

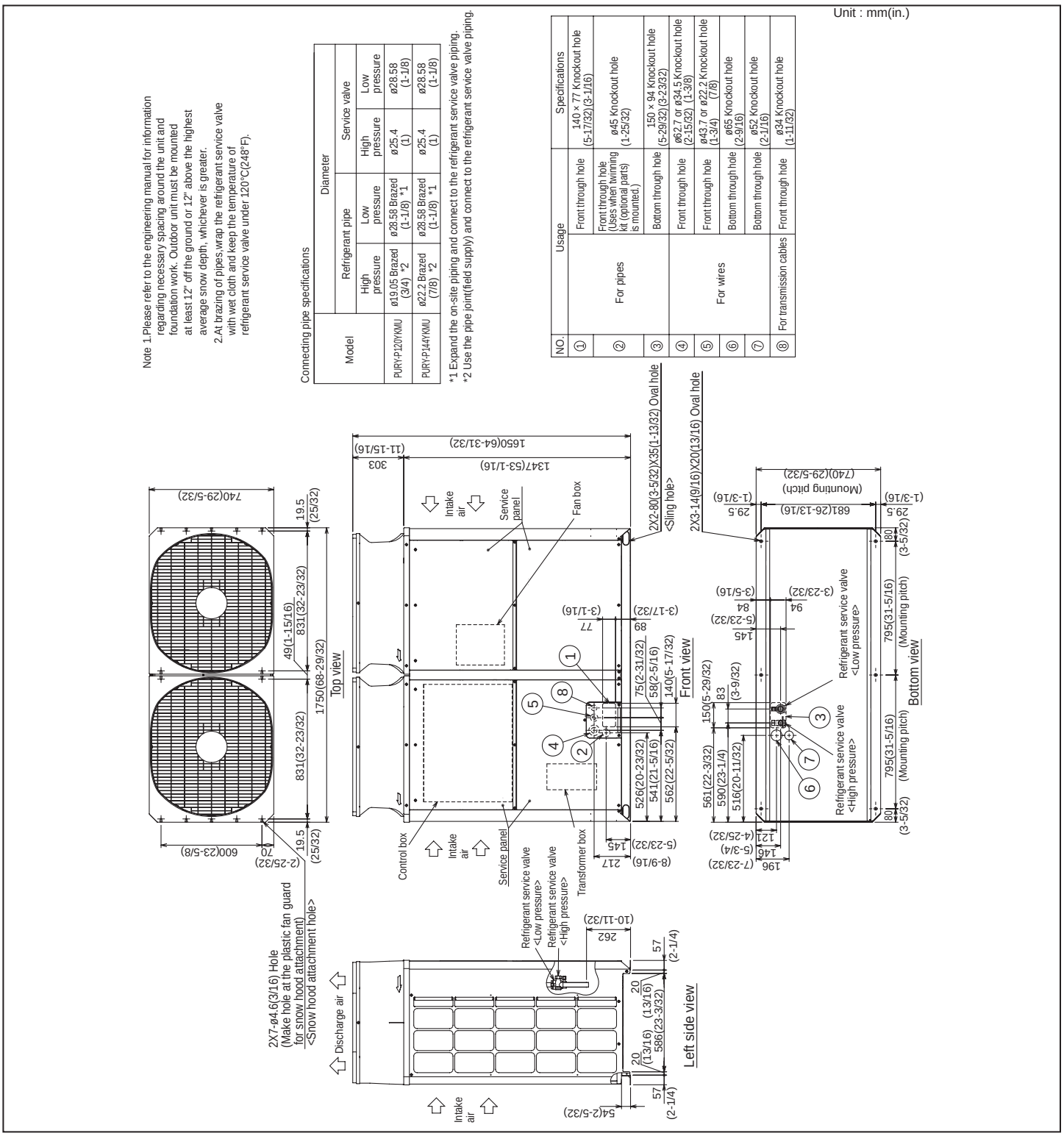
*1. Harsh weather environments may demand performance enhancing equipment. Ask your Mitsubishi Electric representative for more details about your region.

*2. For details on extended cooling operation range down to -10° F DB, see Low Ambient Kit Submittal.

*3. Simultaneous Cooling and Heating Efficiency

Model: PURY-P120YKMU-U (-BS) – DIMENSIONS

Unit : mm(in.)



AHRI CERTIFIED www.ahridirectory.org Variable Refrigerant Flow (VRF) Multi-Split AC and HP AHRI Standard 1230

ETL LISTED C US Intertek

INVERTER

R410A

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FORM# PURY-P120YKMU-U (-BS) - 201407

Specifications are subject to change without notice.

CITY**MULTI**® Model: PEFY-P36NMAU-E3 MITSUBISHI ELECTRIC

Job Name:	
Schedule Reference:	Date:

INDOOR UNIT OPTION 1

GENERAL FEATURES

- Dual set point functionality
- Multiple fan speed settings
- Auto fan mode
- 9-7/8" (250mm) high for low ceiling heights
- Built-in condensate lift; lifts to 27-9/16" (700 mm)
- Ducted fan coil supporting multiple configurations for flexible installation

OPTIONS

- ☐ External Heater Adapter……CN24RELAY-KIT-CM3
- ☐ Filter Box (Includes 2" MERV 13 filter)……FBM2-4

SPECIFICATIONS

Capacity*
Cooling……36,000 Btu/h
Heating……40,000 Btu/h

Power
Power Source……208 / 230V, 1-phase, 60Hz

Power Consumption
Cooling……0.24 kW
Heating……0.22 kW

Current
Cooling……1.50 A
Heating……1.39 A

Minimum Circuit Ampacity (MCA)……3.32 A
Maximum Overcurrent Protection (MOCP) Fuse……15 A

External Finish……Galvanized-steel Sheet

External Dimensions
Inches……9-7/8 H x 55-1/8 W x 28-7/8 D
mm……250H x 1,400W x 732D

Net Weight……86 lbs. / 39 kg

Coil Type……Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan
Type x Quantity……Sirocco Fan x 2
Airflow Rate (Low-Mid-High)……812 - 989 - 1,165 CFM
External Static Pressure…..0.14 - 0.20 - 0.28 - 0.40 - 0.60"WG
Motor Type……DC Motor

Air Filter……Polypropylene Honeycomb

Refrigerant Piping Dimensions
Liquid (High Pressure)……3/8" / 9.52 mm (Brazed)
Gas (Low Pressure)……5/8" / 15.88 mm (Brazed)

Drainpipe Dimension……O.D. 1-1/4" / 32 mm

Sound Pressure Levels
Low-Mid-High……32 - 37 - 41 dB(A)

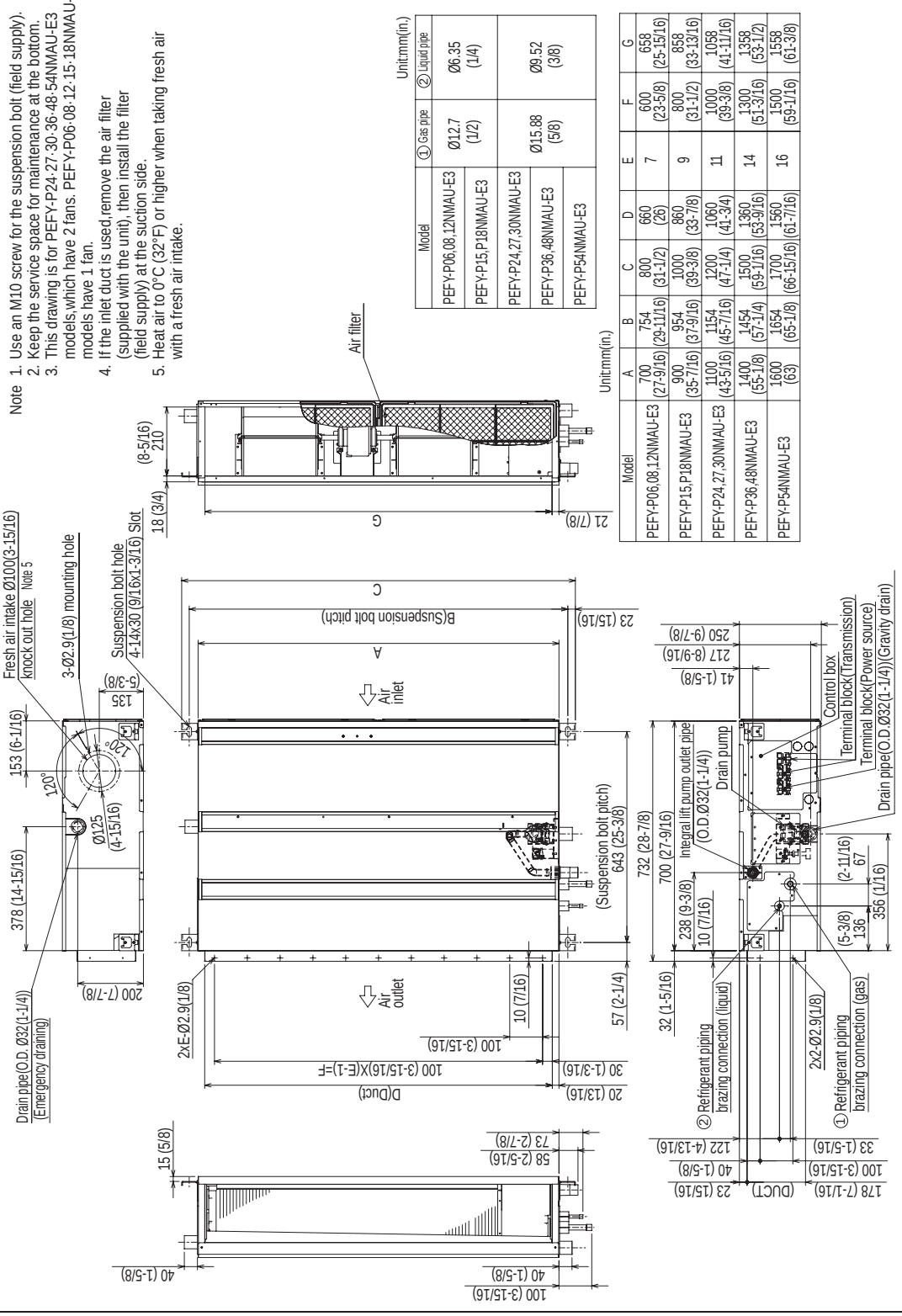
* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (27° C) DB / 67° F (19° C) WB,
Cooling | Indoor: Outdoor 95° F (35° C) DB
Heating | Indoor: 70° F (21° C) DB,
Heating | Outdoor 47° F (8° C) DB / 43° F (6° C) WB

Notes:

R410A

Model: PEFY-P36NMAU-E3 – DIMENSIONS

Unit: mm (in)



Intertek

FORM# PEFY-P36NMAU-E3 - 201402

Specifications are subject to change without notice.

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CITY**MULTI**® Model: PKFY-P30NKMU-E2.TH MITSUBISHI ELECTRIC

Job Name:	
Schedule Reference:	Date:

INDOOR UNIT OPTION 2

GENERAL FEATURES

- Dual set point functionality
- Compact, lightweight, shiny-white, flat-panel design
- Quiet operation
- Multiple fan-speed settings
- Intake grille filter is easily removed for cleaning
- Wireless receiver on board

OPTIONS

- ■ Condensate Pump……SI1730-230
- □ CN24 Relay Kit……CN24RELAY-KIT-CM3

SPECIFICATIONS

Capacity*
Cooling……30,000 Btu/h
Heating……34,000 Btu/h

Power
Power Source……208 / 230V, 1-phase, 60Hz

Power Consumption
Cooling……0.07 kW
Heating……0.07 kW

Current
Cooling……0.50 A
Heating……0.50 A

Minimum Circuit Ampacity (MCA)……0.63 A
Maximum Overcurrent Protection (MOCP) Fuse……15 A

External Finish……Munsell No. 1.0Y 9.2/0.2

External Dimensions
Inches……14-3/8 H x 46-1/16 W x 11-5/8 D
mm……365 H x 1,170 W x 295 D

Net Weight
Unit……46 lbs. / 21 kg

Coil Type……Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan
Type x Quantity……Line Flow Fan x 1
Airflow Rate (Low-High)……710 - 920 CFM
Motor Type……Direct-drive DC Motor

Air Filter……Polypropylene Honeycomb

Refrigerant Piping Dimensions
Liquid (High Pressure)……3/8" / 9.52 mm (Flare)
Gas (Low Pressure)……5/8" / 15.88 mm (Flare)

Drainpipe Dimension……I.D. 5/8" / 16 mm

Sound Pressure Levels
Low-High……43 - 49 dB(A)

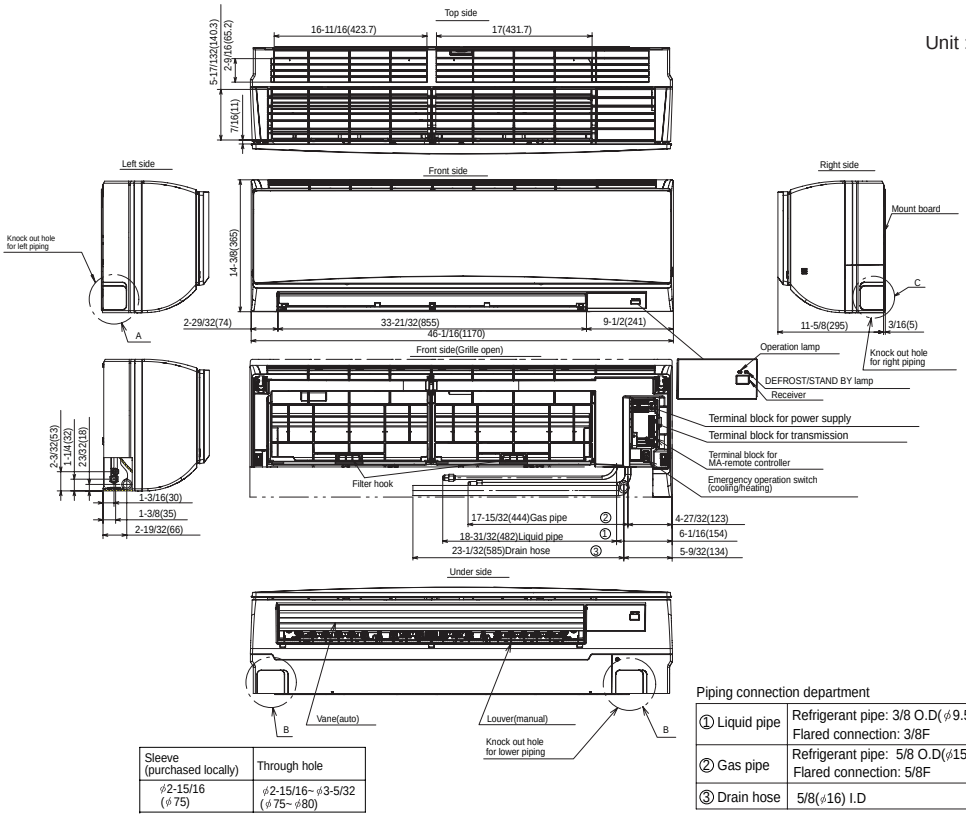
* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (27° C) DB / 67° F (19° C) WB, Outdoor 95° F (35° C) DB
Heating | Indoor: 70° F (21° C) DB, Outdoor 47° F (8° C) DB / 43° F (6° C) WB

Notes:

R410A

Model: PKFY-P30NKMU-E2.TH – DIMENSIONS

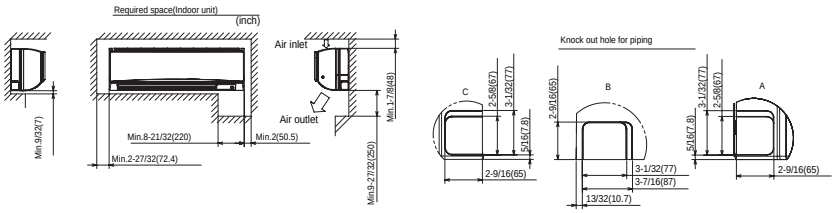
Unit : in(mm)

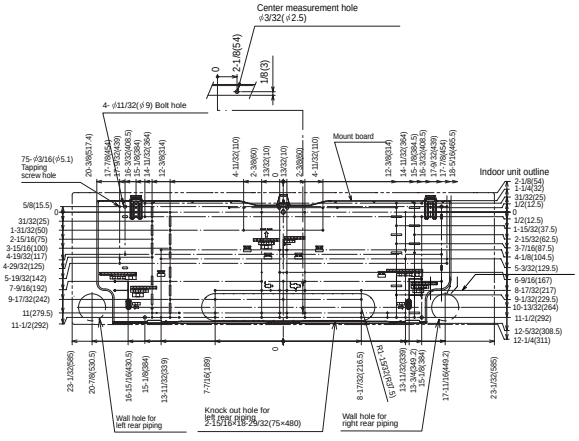


Sleeve (purchased locally)	Through hole
ϕ2-15/16 (ϕ 75)	ϕ2-15/16~ ϕ3-5/32 (ϕ 75~ ϕ80)

Piping connection department

① Liquid pipe	Refrigerant pipe: 3/8 O.D(ϕ9.52) Flared connection: 3/8F
② Gas pipe	Refrigerant pipe: 5/8 O.D(ϕ15.88) Flared connection: 5/8F
③ Drain hose	5/8(ϕ16) I.D





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Specifications are subject to change without notice.

PVFY-P54NAMU-E

Job Name:	
System Reference:	Date:

INDOOR UNIT OPTION 3

PVFY-P54NAMU-E

GENERAL FEATURES

- Multi-position design is suitable for any application requires no additional kits, even for downflow configuration
- Dual set point functionality
- Designed specifically for use with CITY MULTI® outdoor units
- Choice of three fan speeds for optimum comfort
- Highly efficient DC motor and a forward curved blower ensures quiet, consistent fan operation
- Optional relay kit provides functionality for two stage auxiliary heat (1 kit per stage), humidifier integration, or other custom applications
- Control board includes a condensate overflow switch connection
- Heavy-gauge steel cabinets with 1” fiberglass-free foam insulation with an R-4.2 insulation value
- Suitable for use in air handling spaces in accordance with Section 18.2 of UL 1995 4th Edition
- Tested in accordance with ANSI/ASHRAE Standard 193; less than 1% air leakage at maximum airflow

ACCESSORIES:

- ☐ Relay Kit……CN24RELAY-KIT-CM3
- ☐ Fan Speed Indication Adapter……PAC-735

SPECIFICATIONS:

Capacity*		
Cooling	Btu/h	54,000
Heating	Btu/h	60,000

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor : 80° F (27° C) DB / 67° F (19° C) WB
Cooling | Outdoor : 95° F (35° C) DB
Heating | Indoor : 70° F (21° C) DB
Heating | Outdoor : 47° F (8° C) DB / 43° F (6°C) WB

Electrical		
Electrical Power Requirements	1-phase, 208 / 230V, 60Hz	
Minimum Circuit Ampacity (MCA)	A	5.63 / 5.63
Maximum Fuse Size	A	15

External Dimensions		
Height	In.(mm)	59-1/2 (1,511)
Width	In.(mm)	25 (635)
Depth	In.(mm)	21-5/8 (548)

Net Weight	Lbs.(kg)	172 (78)
External Finish	High-gloss polyester powder coated	
Coil Type	Cross Fin (Aluminum Plate Fin and Copper Tube)	

Fan		
Type x Quanity	Sirocco fan x 1	
Airflow rate (Low - Mid - High)	CFM	1,040 - 1,262 - 1,485
External Static Pressure	In. WG	0.30 / 0.50 / 0.80 (Selectable)
Motor Type	DC motor	

Air Filter	Polypropylene Honeycomb

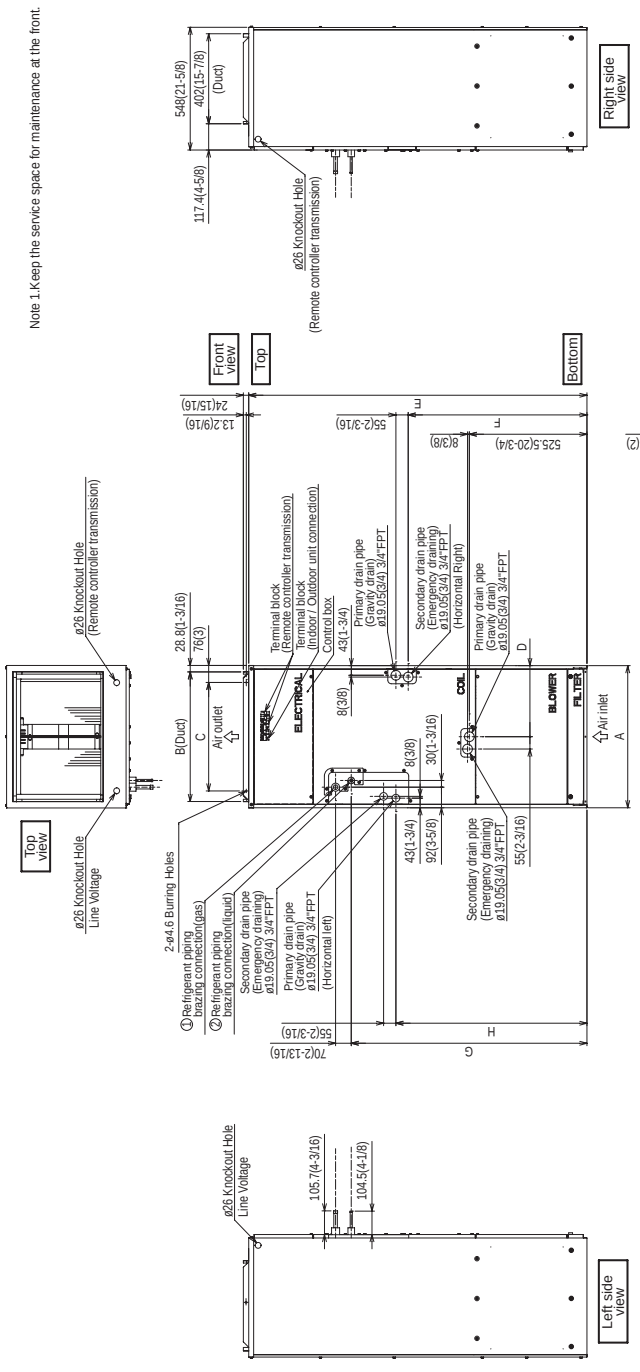
Refrigerant Piping Diameter		
Liquid (High Pressure)	In.(mm)	3/8 (9.52) Brazed
Gas (Low Pressure)	In.(mm)	5/8 (15.88) Brazed

Field Drain Pipe Size	In.(mm)	FPT 3/4 (19.05)

Sound Data (Low - Mid - High) (measured in anechoic room)		
Sound Pressure Level	dB(A)	36 - 40 - 44

Model: PVFY-P54NAMU-E – DIMENSIONS

Units: mm (in.)



Model	③Nominal Filter Size	Duct Connection
PVFY-P12NAMU-E	508×406.4×25.4 (20×16×1)	376×402 (14-13/16×15-7/8)
PVFY-P18NAMU-E		
PVFY-P24NAMU-E		
PVFY-P30NAMU-E	508×508×25.4 (20×20×1)	477×402 (18-13/16×15-7/8)
PVFY-P36NAMU-E		
PVFY-P48NAMU-E	508×609.6×25.4 (20×24×1)	579×402 (22-13/16×15-7/8)
PVFY-P54NAMU-E		

Unit:mm(in.)

Model	A	B	C	D	E	F	G	H	J	①Gas pipe	②Liquid pipe
PVFY-P12NAMU-E	432 (17)	376 (14-13/16)	281 (11-1/8)	224 (8-7/8)	1275 (50-1/4)	680 (26-13/16)	823 (32-7/16)	735.5 (29)	360 (14-3/16)	ø12.7 (1/2)	ø6.35 (1/4)
PVFY-P18NAMU-E											
PVFY-P24NAMU-E											
PVFY-P30NAMU-E	534 (21)	477 (18-13/16)	382.6 (15-1/8)	266.5 (10-1/2)	1378 (54-1/4)	737 (29-1/16)	953.5 (37-9/16)	792 (31-3/16)	461 (18-3/16)	ø15.88 (5/8)	ø9.52 (3/8)
PVFY-P36NAMU-E											
PVFY-P48NAMU-E	635 (25)	579 (22-13/16)	484.6 (19-1/8)	317.5 (12-1/2)	1511 (59-1/2)	798.5 (31-7/16)	1053 (41-1/2)	853.5 (33-5/8)	563 (22-3/16)		
PVFY-P54NAMU-E											

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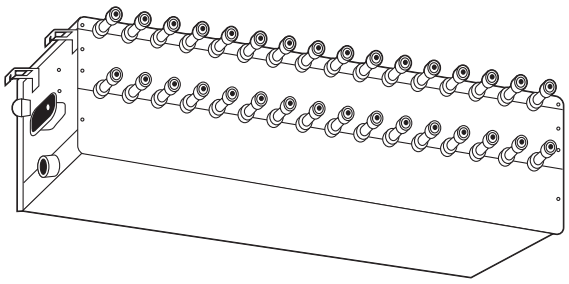
Form# PVFY-P54NAMU-E - 201503

CITY**MULTI**® Model: CMB-P1016NU-G MITSUBISHI ELECTRIC

Job Name:

Schedule Reference: | Date:



BC CONTROLLER FEATURES

- Used with R2-Series and WR2-Series outdoor units only
- Each branch supports 54,000 Btu/h or less
- Reducers are included for indoor units 18,000 Btu/h or less

OPTIONS

- Joint Adapter (Port Connector).....CMY-R160C-J
- Condensate Pump.....SI30-230

SPECIFICATIONS

Power

Power Source . . . . . 208 / 230V, 1 phase, 60Hz

Power Input

- Cooling . . . . . 0.217 kW
- Heating . . . . . 0.106 kW

Current

- Cooling (208 / 230) . . . . . 1.04 / 0.94 A
- Heating (208 / 230) . . . . . 0.51 / 0.46 A

Minimum Circuit Ampacity (MCA) (208 / 230) . . . . . 1.30 / 1.18 A

Maximum Overcurrent Protection (MOCP) . . . . . 15 A

External Finish . . . . . Galvanized Steel Plate

External Dimensions

Inches . . . . . 11-3/16 h x 43-1/4 w x 17 d

mm . . . . . 284 h x 1,098 w x 432 d

Net Weight . . . . . 138 lbs. / 62 kg

Number of Branches 16

Indoor Unit Capacity

Connectable to one Branch

- Model P54 or smaller
- Use optional port connector combining two branches when the total unit capacity exceeds 55,000 Btu/h. Use the reducer (standard accessory) when an indoor unit of 18,000 Btu/h or smaller is connected.

Refrigerant R410A

Refrigerant Piping Diameter

To Outdoor and Water-source Units

P72

- High Pressure Pipe . . . . . 5/8" / 15.88 mm Brazed
- Low Pressure Pipe . . . . . 3/4" / 19.05 mm Brazed

P96/P108

- High Pressure Pipe . . . . . 3/4" / 19.05 mm Brazed
- Low Pressure Pipe . . . . . 7/8" / 22.2 mm Brazed

P126

- High Pressure Pipe . . . . . 3/4" / 19.05 mm Brazed
- Low Pressure Pipe . . . . . 1-1/8" / 28.58 mm Brazed

To Indoor Unit

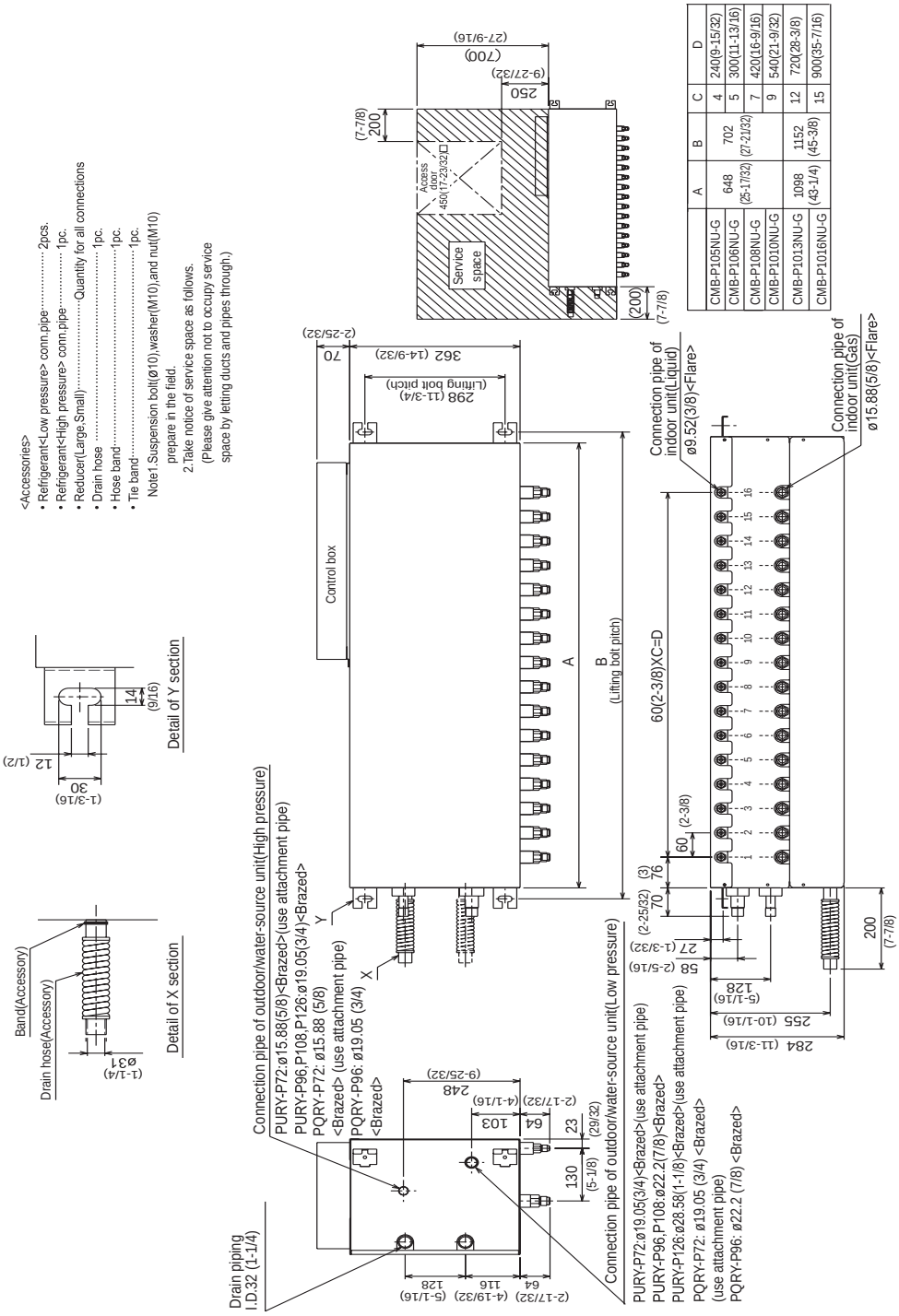
- Liquid Pipe . . . . . 3/8" / 9.52 mm Flare (1/4" / 6.35 mm with attached reducer used)
- Gas Pipe . . . . . 5/8" / 15.88 mm Flare (1/2" / 12.7 mm with attached reducer used, 3/4" / 19.05 mm and 7/8" / 22.2 mm with optional port connector used)

Drainpipe . . . . . O.D. 1-1/4" / 32 mm

Notes:

Model: CMB-P1016NU-G – DIMENSIONS

Drw. : CMB-P-NU-G_W659644
Unit : mm(in)



	A	B	C	D
CMB-P105NU-G	648 (25-17/32)	702 (27-21/32)	4	240(9-15/32)
CMB-P106NU-G			5	300(11-13/16)
CMB-P108NU-G			7	420(16-9/16)
CMB-P1010NU-G			9	540(21-9/32)
CMB-P1013NU-G	1098 (43-1/4)	1152 (45-3/8)	12	720(28-3/8)
CMB-P1016NU-G			15	900(35-7/16)

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FORM# CMB-P1016NU-G - 201503

Basis of Design Narrative - Fire Station 55

City of San Rafael - Essential Facilities Strategic Plan
2015-0131

prepared for:
Mary McGrath Architects

prepared by:
Eunice Yoon, PE, LEED AP, BD+C
Jared Doescher, PE, LEED AP
Jason Lau, PE, LEED AP
Thomas de Senna, PE

June 22, 2015

INTERFACE ENGINEERING

Assessment of Current City of San Rafael Essential Facilities Fire Station #55

- **Mechanical Assessment**

  Fire Station #55 is a single story building with attached apparatus bay built in 1966. The gas furnace seems to be part of the original installation and is located in a small mechanical room accessible from the outside of the building with louvered doors. The gas furnace provides heating to the living quarters and the ventilation is provided with operable windows. No mechanical cooling is currently available for the building. The existing gas furnace is antiquated and has exceeded the recommended useful life. The Toilet and Shower room are provided with original ceiling mounted exhaust fans on a dial timer switch. The exhaust fans serving these rooms have exceeded its recommended useful life and shall be replaced.

  The Apparatus Bay portion of the building has no cooling system and has gas unit heaters mounted close to the roof. The engine exhaust duct system seems to be working properly and well maintained. The exhaust fan for the engine exhaust system has approximately 10 years of useful life.

- **Plumbing Assessment**

  The existing piping systems in the building are mostly original and are nearing the end of their service life.

  The sewer lateral from the building flows west under the main driveway and small park area on the property. We were unable to verify the size or assess the condition of the underground and below slab piping. Original design drawings indicate that the sewer main may be 6".

  Roof drainage is by gutters and downspouts and spills to grade. Several of the downspouts are damaged or corroded.

  The building is served by a 1" water meter located in the landscape area at the south side of the building. The existing piping at the point of connection to the building appears to be galvanized steel. We were unable to assess the condition of the underground piping. Hot water is supplied from a gas fired water heater, installed in 2011. The domestic hot water system is uncirculated.

  The existing bathroom plumbing fixtures are original, non-water conserving fixtures.

  Natural gas service enters at the south side of the building. It runs above ceiling to serve the apparatus bay heaters, water heater, furnace, kitchen range, and outdoor grill. Piping inside of the building appears to be in functional condition. Piping outside of the building is severely corroded.

- **Electrical Assessment**

  Fire Station #55 is currently served by a single PG&E service. Power is derived from an underground PG&E vault outside the fire station to a meter and main disconnect switch located in the Apparatus Bay. The PG&E meter number is #1009715174. The main service meter pedestal is rated at 200A, 120/240V, 1-phase, 3-wire, with a 150A/2P main breaker. The main disconnect switch feeds to a manual transfer switch, which has a power cord with a receptacle plug to serve a portable emergency generator. The transfer switch appears to have two output feeders that feed the following:

  - Load Center (125A, 120/240V, 1-phase, 3-wire with 8 poles and 30A/2P main breaker). Located in Apparatus Bay. Load center is utilizing residential style tandem breakers. Manufacturer is by General Electric. Appears antiquated and near end of manufacturer's recommended design life.

  - Panel "A" (225A, 120/240V, 1-phase, 3-wire with 42 poles). Located in closet of Office. There are (2) single pole spaces available within the panelboard. Manufacturer is by Westinghouse. Appears antiquated and approximately 50 years old. Existing location does not allow for Code-minimum working clearances.

  Emergency power is derived from a portable diesel-engine generator. The generator is a Honda EB10000 rated at 9.0kVA, 120/240V, 1-phase, 3-wire with a 8 hours fuel tank capacity at full load. The generator plugs into the receptacle cord outlet coming from the manual transfer switch.

  Existing lighting system appears to be part of the original construction in the building, consisting of fluorescent and incandescent luminaires. Fluorescent luminaires consist of striplights with (2)-32 watt T8 lamps in the Apparatus Bay. Incandescent downlights were located within the office and living quarters of the building. Luminaires appeared in poor condition, with missing lenses for several downlights. Toggle switches controlled the majority of the luminaires. There does not appear to be automatic lighting shutoff for the building, only contactors for control of outdoor lighting. The outdoor lighting consists of antiquated incandescent floodlights and incandescent wall-mounted cylinders.

  The existing building is not supported by a fire alarm system. There are individual battery-operated smoke detectors located within the living quarters. No smoke detectors were observed in the Apparatus Bay Building. The new building will require an addressable fire alarm system.

- **Telecommunications Assessment**

  Telecommunication service for the fire station terminates to a telephone backboard located in a closet within the office. Security equipment and other low voltage equipment enclosures are located within the closet and mounted on the plywood backboard.

  There is a communications equipment cabinet located in the Apparatus Bay. It appears to contain equipment serving a public address speaker system. Antenna cables are routed out of the cabinet and up to the exterior roof. There is also telephone punch block mounted on plywood backboard next to the communications equipment cabinet.

- **Option 2 HVAC System Description**

  VRF/HR with Fan coils to provide space heating & cooling.

  Commercial VRF Condensing Units: Provide outdoor and indoor VRF system as described in Option 1.

  Apparatus Bay: Existing gas unit heaters will be reused to provide heating and roll up doors will provide ventilation to the space.

  Commercial Kitchen: Existing kitchen hood and exhaust fan will be reused.

  Residential Laundry room: Provide as described in Option 1.

  Bathroom Exhaust System: Provide as described in Option 1.

  Control System: Provide as described in Option 1.

- **Option 2 Plumbing System Description**

  Sanitary Sewer and Vent System: Provide the following:

  - Scope all existing below and above grade waste piping to the point of connection to the city sewer west of the property. Replace or repair all damaged piping.
  - New waste and vent piping to all new and relocated plumbing fixtures such as water closet, lavatory, tub/shower, washing machine, janitor mop sinks, floor drain and sinks, indirect waste receptors, and other fixtures. Reuse existing rough-ins where possible.
  - Pipe condensate from mechanical equipment to indirect receptors.

  Storm Drainage System:

  - Replace damaged gutters and downspouts.
  - Relocate gutters and downspouts and correct site grading as needed to properly conduct storm drainage away from the building and toward site storm drains and catch basins.

  Domestic Water System:

  - Replace all existing below grade domestic water piping from the point of connection at the water meter. Replace any damaged or corroded existing above grade domestic water piping. Replace any existing galvanized steel domestic water piping with copper.
  - Provide new domestic CW and HW to any new or relocated fixtures. Reuse existing rough-ins where possible. New fixtures may include the following:
    - Bathroom fixtures (water closets, urinals, lavatories, and showers)
    - Washing machine box
    - Janitor mop sinks
    - Trap primers(CW only) to serve floor drains

    - Mechanical equipment requiring make-up water with backflow device.
    - Hose bibs
- Provide a reduced-pressure type backflow preventer or acceptable equivalent per Water Department requirement.
- Provide a new gas fired domestic water heater and circulating pump.
- Provide irrigation water to landscaping as required.

Plumbing Fixtures:

- Provide all new plumbing fixtures as follows:
    - Water closets: Wall-hung with 1.28 gallons per flush, flush valves
    - Urinals: Wall-hung with 1/8 gallon per flush, flush valve
    - Private Lavatories: Wall hung or counter mounted fixture with 1.0 gpm faucet
    - Public lavatories: Wall-hung or counter-mounted fixture with 0.5 gpm faucet
    - Shower: 1.8 gpm shower head.

- Provide interior and exterior hose bibs with vacuum breakers.
- New floor drains and floor sinks, with trap primers, where indicated. Locate trap primer where accessible or in-wall with access panel. Reuse existing floor fixtures that are in good condition.

Natural Gas: Provide the following:

- Inspect all existing natural gas piping and replace any damaged or corroded piping. Reuse existing piping that is in good condition.
- Provide natural gas to all gas fired appliances such as heaters, furnaces, water heaters, ranges, and dryers utilizing existing piping and routing when possible.

Piping Materials: Provide all new materials as follows:

- Sanitary sewer (SS) and vent system: Service weight no-hub cast iron soil pipe and fittings with standard couplings above ground and heavy weight cast iron soil pipe and fittings with heavy-duty couplings below ground. Provide corrosion protection for below grade piping as recommended by Geotechnical Engineer.
- Potable domestic cold water (CW) system: Type L hard drawn copper tube above ground; Type K hard drawn copper tube below ground.
- Potable domestic hot water (HW) system: Type L hard drawn copper tube aboveground.
- Natural Gas System:
    - Above ground: Schedule 40, A53 black steel pipe and threaded malleable iron fittings. Galvanized steel for piping exposed to weather.
    - Below ground: Schedule 40, A53 black steel pipe and threaded malleable fittings 2-1/2 inches and smaller. Welded pipe 3 inches and larger. Pipe below grade wrapped with double thickness Scotchwrap No. 51 applied over Scotchwrap pipe primer. Factory applied epoxy coating to equivalent thickness with field wrapped or epoxied joints approved. Alternately, Polyethylene piping with tracer wire to meet CPC.
- Condensate Drain System: Type M copper tube with solder joints.

- **Option 2 Electrical System Description**

  Service Capacity: If the existing demand load can be verified by PG&E to be significantly less than the rated capacity of existing service, it may be possible to keep the existing PG&E service and just replace the antiquated electrical distribution equipment.

  New Generator System: In order to reduce cost on the project, it is recommended to size the emergency generator to support only Code-required standby loads, in lieu of the whole fire station. The emergency generator, automatic transfer switch, and emergency panelboard would be reduced as a result.

  Site Lighting: Provide as described in Option 1.

  Interior Lighting: Remove option for tap-out system.

  Power Distribution: Provide as described in Option 1.

- **Telecommunication System Description**

  Incoming cable terminations shall remain in the same location if the location of the telephone backboard does not change. Otherwise, the cable terminations shall be relocated to a new location such as a new IT room. ¾-inch by 4-foot by 8-foot fire rated plywood backboards will be provided on every wall in the IT room. The IT room will have a telecommunications ground bus bar with a #3/0 copper ground to the main electrical panel and to building steel. Termination blocks will be wall mounted and will cross-connect with the PBX switch and distribute dial tone throughout the facility.

  Metallic 2-gang outlet boxes with single gang adapters with 1 inch metallic conduit/raceways to accessible ceiling space will be provided for routing and termination of voice, data and CATV cabling. Telecom locations will be based on Owner input. Raceway installed per ANSI/TIA/EIA-569-B standards.

  Electronic card key access will be provided at identified entry doors and any site gates that are secure. All exterior doors will be monitored via door position switches and CCTV. A keypad with and LCD display will be provided at the main entrance for arm/disarm operation as well as determining which doors are operational or not.

  Metallic single-gang outlet boxes with ½ -inch metallic conduit/raceways to accessible ceiling space will be provided for routing and termination of the security/access control cabling. Security/access control locations will be based on Owner input. Raceway installed per ANSI/TIA/EIA-569-B standards.

  The paging system will be designed to provide program distribution and all-call to speakers throughout and provide local amplification. Coverage will be included for the entire interior of both buildings as well as exterior areas as designated by the Owner. The system will be required to be interfaced to the telephone system for general paging from any telephone instrument.

One inch metallic conduit/raceways will be provided for routing and termination of the Paging System. Speaker and volume control locations will be based on Owner input. Raceway installed per ANSI/TIA/EIA-569-B standards.

The existing communication equipment cabinet shall be coordinated with the Owner to determine whether it should be reused as part of the renovation.

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Electrical Appendix

Figure E1: Potential PG&E Vault Location Serving Fire Station

Figure E2: Main Service Meter and Pedestal

Figure E3: Manual Transfer Switch, Load Center, and Telephone Backboard

Figure E4: Communication Equipment Cabinet

Figure E5: Telephone and Security Equipment in Office Closet

Figure E6: Branch Circuit Panelboard `A' in Office Closet

Mechanical Appendix

CITYMULTI® Model: 10-TON PURY-P120YKMU-U (-BS)

MITSUBISHI ELECTRIC

Job Name:

Schedule Reference: | Date:

OUTDOOR VRF HEAT PUMP WITH HEAT RECOVERY SYSTEM FEATURES

- Assembled in USA
- INVERTER-driven compressor
- Air-source, simultaneous cooling and heating
- Long line lengths - for details see Engineering Manual
- Connects to CITY MULTI indoor units
- Controlled via CITY MULTI Controls Network

UNIT OPTION

□ Standard Model……PURY-P120YKMU-U
■ Seacoast (BS) Model……PURY-P120YKMU-U-BS

OPTIONAL PARTS

□ Joint Kit……for details see Pipe Accesories Submittal
■ BC Controller……for details see BC Controller Submittals
□ Low Ambient Kit ……for details see Low Ambient Kit Submittal
□ Snow/Hail Guards Kit……for details see Snow/Hail Guards Kit Submittal

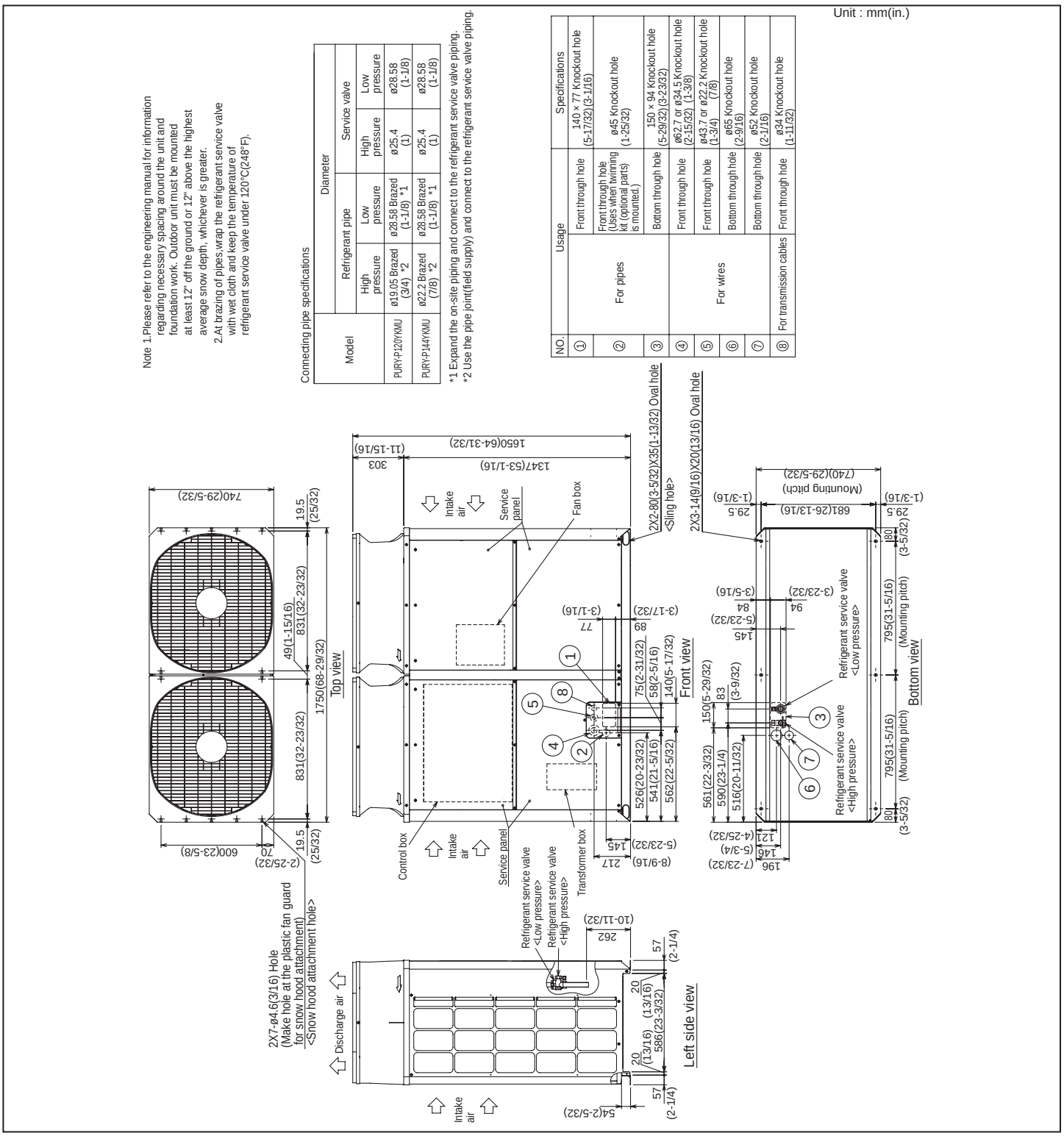
Specifications		Model Name
Unit Type		PURY-P120YKMU-U (-BS)
Nominal Cooling Capacity (460V)	Btu/h	120,000
Nominal Heating Capacity (460V)	Btu/h	135,000
Operating Temperature Range *1	Cooling (Outdoor) *2	23~115° F (-5~46° C) DB
	Heating (Outdoor)	-4~60° F (-20~15.5° C) WB
External Dimensions (H x W x D)	In. (mm)	64-31/32 x 68-29/32 x 29-5/32 (1,650 x 1,750 x 740)
Net Weight	Lbs. (kg)	743 (337)
External Finish		Pre-coated galvanized steel sheet
Electrical Power Requirements	Voltage, Phase, Hertz	460V, 3-Phase, 60Hz
Minimum Circuit Ampacity (MCA)	A	21
Maximum Fuse Size	A	25
Piping Diameter (Brazed) (In. / mm)	Liquid (High Pressure)	3/4 (19.05) Brazed
	Gas (Low Pressure)	1-1/8 (28.58) Brazed
Max. Total Refrigerant Line Length	Ft.	1,969
Max. Refrigerant Line Length (Between ODU & IDU)	Ft.	541
Max. Control Wiring Length	Ft.	1,650
Indoor Unit	Total Capacity	50~150% of outdoor unit capacity
	Model / Quantity	P06~P96/1~30
Sound Pressure Levels	dB(A)	60
Fan		
Type x Quantity		Propeller fan x 2
Airflow Rate	CFM	11,300
External Static Pressure	In. WG	Selectable; 0, 0.12 or 0.24"WG; factory set to 0"W.G.
Compressor Operating Range		15% to 100%
Compressor Type x Quantity		Inverter scroll hermetic compressor
Refrigerant		R410A x 26 lbs + 1 oz (11.8 kg)
Protection Devices	High Pressure	High pressure sensor, High pressure switch at 4.15 MPa (601 psi)
	Inverter Circuit (Comp. / Fan)	Over-current protection
	Fan Motor	Thermal switch
AHRI Ratings (Ducted/Non-Ducted)	EER	11.7 / 12.2
	IEER	18.6 / 20.8
	COP	3.45 / 3.61
Simultaneous Rating (Ducted/Non-Ducted)	SCHE *3	16.80 / 19.70
Blue Fin Anti-corrosion Protection: Cellulose- and polyurethane-resin coating treatment applied to condenser coil that protects it from air contaminants **Standard:** ≥1µm thick; Salt Spray Test Method - no unusual rust development to 480 hours. **Seacoast (BS):** ≥1µm thick; Salt Spray Test Method - no unusual rust development to 960 hours.		

NOTES:

*1. Harsh weather environments may demand performance enhancing equipment. Ask your Mitsubishi Electric representative for more details about your region.
*2. For details on extended cooling operation range down to -10° F DB, see Low Ambient Kit Submittal.
*3. Simultaneous Cooling and Heating Efficiency

Model: PURY-P120YKMU-U (-BS) – DIMENSIONS

Unit : mm(in.)



AHRI CERTIFIED www.ahridirectory.org Variable Refrigerant Flow (VRF) Multi-Split AC and HP AHRI Standard 1230

ETL LISTED C US Intertek

INVERTER

R410A

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FORM# PURY-P120YKMU-U (-BS) - 201407

Specifications are subject to change without notice.

CITY**MULTI**® Model: PEFY-P36NMAU-E3 MITSUBISHI ELECTRIC

Job Name:	
Schedule Reference:	Date:

INDOOR UNIT OPTION 1

GENERAL FEATURES

- Dual set point functionality
- Multiple fan speed settings
- Auto fan mode
- 9-7/8" (250mm) high for low ceiling heights
- Built-in condensate lift; lifts to 27-9/16" (700 mm)
- Ducted fan coil supporting multiple configurations for flexible installation

OPTIONS

□ External Heater Adapter……CN24RELAY-KIT-CM3
□ Filter Box (Includes 2" MERV 13 filter)……FBM2-4

SPECIFICATIONS

Capacity*
Cooling……36,000 Btu/h
Heating……40,000 Btu/h

Power
Power Source……208 / 230V, 1-phase, 60Hz
Power Consumption
Cooling……0.24 kW
Heating……0.22 kW
Current
Cooling……1.50 A
Heating……1.39 A
Minimum Circuit Ampacity (MCA)……3.32 A
Maximum Overcurrent Protection (MOCP) Fuse……15 A

External Finish……Galvanized-steel Sheet

External Dimensions
Inches……9-7/8 H x 55-1/8 W x 28-7/8 D
mm……250H x 1,400W x 732D

Net Weight……86 lbs. / 39 kg

Coil Type……Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan
Type x Quantity……Sirocco Fan x 2
Airflow Rate (Low-Mid-High)……812 - 989 - 1,165 CFM
External Static Pressure…..0.14 - 0.20 - 0.28 - 0.40 - 0.60"WG
Motor Type……DC Motor

Air Filter……Polypropylene Honeycomb

Refrigerant Piping Dimensions
Liquid (High Pressure)……3/8" / 9.52 mm (Brazed)
Gas (Low Pressure)……5/8" / 15.88 mm (Brazed)

Drainpipe Dimension……O.D. 1-1/4" / 32 mm

Sound Pressure Levels
Low-Mid-High……32 - 37 - 41 dB(A)

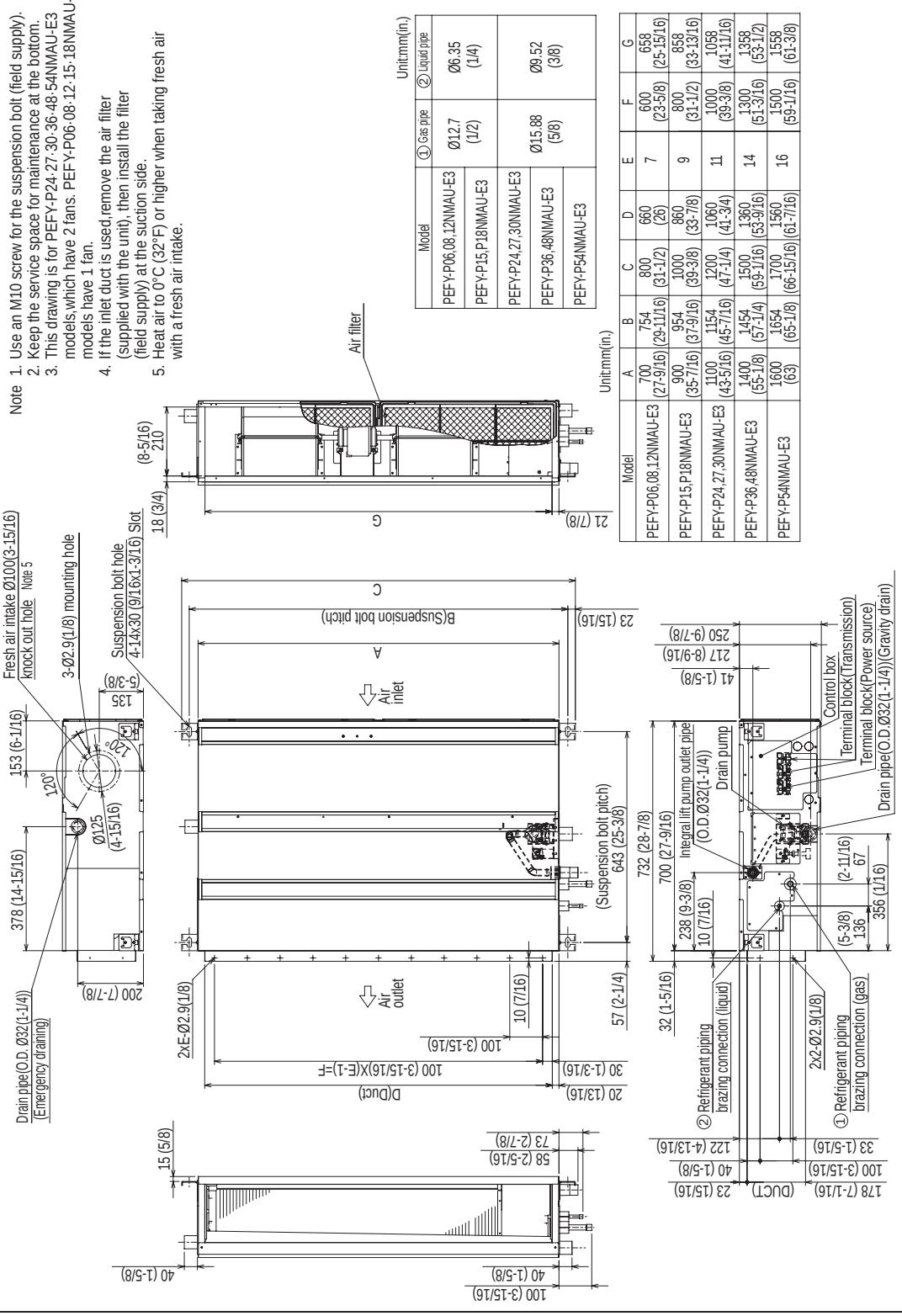
* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (27° C) DB / 67° F (19° C) WB,
Cooling | Indoor: Outdoor 95° F (35° C) DB
Heating | Indoor: 70° F (21° C) DB,
Heating | Outdoor 47° F (8° C) DB / 43° F (6° C) WB

Notes:

R410A

Model: PEFY-P36NMAU-E3 – DIMENSIONS

Unit: mm (in)



Intertek

FORM# PEFY-P36NMAU-E3 - 201402

Specifications are subject to change without notice.

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CITY**MULTI**® Model: PKFY-P30NKMU-E2.TH MITSUBISHI ELECTRIC

Job Name:	
Schedule Reference:	Date:

INDOOR UNIT OPTION 2

GENERAL FEATURES

- Dual set point functionality
- Compact, lightweight, shiny-white, flat-panel design
- Quiet operation
- Multiple fan-speed settings
- Intake grille filter is easily removed for cleaning
- Wireless receiver on board

OPTIONS

■ Condensate Pump……SI1730-230
□ CN24 Relay Kit……CN24RELAY-KIT-CM3

SPECIFICATIONS

Capacity*
Cooling……30,000 Btu/h
Heating……34,000 Btu/h

Power
Power Source……208 / 230V, 1-phase, 60Hz
Power Consumption
Cooling……0.07 kW
Heating……0.07 kW
Current
Cooling……0.50 A
Heating……0.50 A
Minimum Circuit Ampacity (MCA)……0.63 A
Maximum Overcurrent Protection (MOCP) Fuse……15 A

External Finish……Munsell No. 1.0Y 9.2/0.2

External Dimensions
Inches……14-3/8 H x 46-1/16 W x 11-5/8 D
mm……365 H x 1,170 W x 295 D

Net Weight
Unit……46 lbs. / 21 kg

Coil Type……Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan
Type x Quantity……Line Flow Fan x 1
Airflow Rate (Low-High)……710 - 920 CFM
Motor Type……Direct-drive DC Motor

Air Filter……Polypropylene Honeycomb

Refrigerant Piping Dimensions
Liquid (High Pressure)……3/8" / 9.52 mm (Flare)
Gas (Low Pressure)……5/8" / 15.88 mm (Flare)

Drainpipe Dimension……I.D. 5/8" / 16 mm

Sound Pressure Levels
Low-High……43 - 49 dB(A)

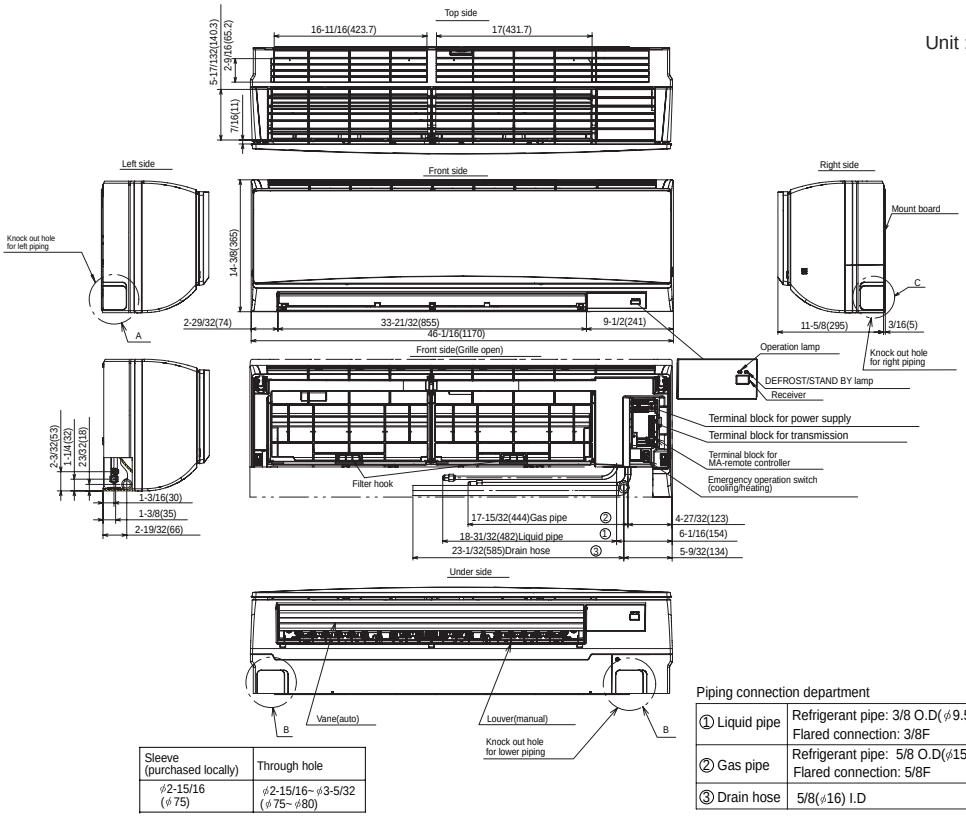
* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (27° C) DB / 67° F (19° C) WB, Outdoor 95° F (35° C) DB
Heating | Indoor: 70° F (21° C) DB, Outdoor 47° F (8° C) DB / 43° F (6° C) WB

Notes:

R410A

Model: PKFY-P30NKMU-E2.TH – DIMENSIONS

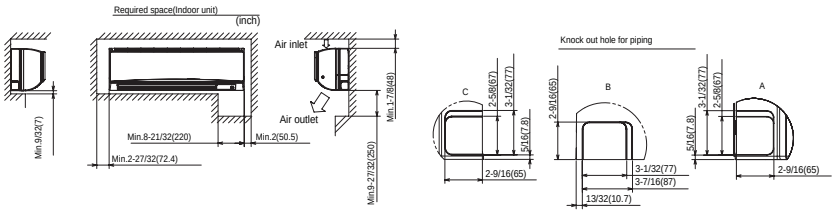
Unit : in(mm)

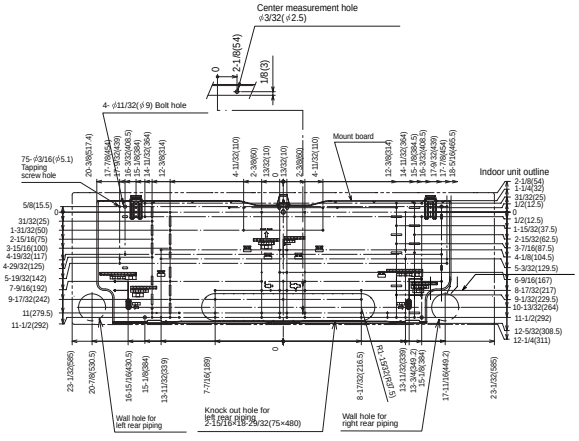


Sleeve (purchased locally)	Through hole
ϕ2-15/16 (ϕ 75)	ϕ2-15/16~ ϕ3-5/32 (ϕ 75~ ϕ80)

Piping connection department

① Liquid pipe	Refrigerant pipe: 3/8 O.D(ϕ9.52) Flared connection: 3/8F
② Gas pipe	Refrigerant pipe: 5/8 O.D(ϕ15.88) Flared connection: 5/8F
③ Drain hose	5/8(ϕ16) I.D





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Specifications are subject to change without notice.

PVFY-P54NAMU-E

Job Name:	
System Reference:	Date:

INDOOR UNIT OPTION 3

PVFY-P54NAMU-E

GENERAL FEATURES

- Multi-position design is suitable for any application requires no additional kits, even for downflow configuration
- Dual set point functionality
- Designed specifically for use with CITY MULTI® outdoor units
- Choice of three fan speeds for optimum comfort
- Highly efficient DC motor and a forward curved blower ensures quiet, consistent fan operation
- Optional relay kit provides functionality for two stage auxiliary heat (1 kit per stage), humidifier integration, or other custom applications
- Control board includes a condensate overflow switch connection
- Heavy-gauge steel cabinets with 1" fiberglass-free foam insulation with an R-4.2 insulation value
- Suitable for use in air handling spaces in accordance with Section 18.2 of UL 1995 4th Edition
- Tested in accordance with ANSI/ASHRAE Standard 193; less than 1% air leakage at maximum airflow

ACCESSORIES:

- □ Relay Kit……CN24RELAY-KIT-CM3
- □ Fan Speed Indication Adapter……PAC-735

SPECIFICATIONS:

Capacity*		
Cooling	Btu/h	54,000
Heating	Btu/h	60,000

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor : 80° F (27° C) DB / 67° F (19° C) WB
Cooling | Outdoor : 95° F (35° C) DB
Heating | Indoor : 70° F (21° C) DB
Heating | Outdoor : 47° F (8° C) DB / 43° F (6°C) WB

Electrical		
Electrical Power Requirements	1-phase, 208 / 230V, 60Hz	
Minimum Circuit Ampacity (MCA)	A	5.63 / 5.63
Maximum Fuse Size	A	15

External Dimensions		
Height	In.(mm)	59-1/2 (1,511)
Width	In.(mm)	25 (635)
Depth	In.(mm)	21-5/8 (548)

Net Weight	Lbs.(kg)	172 (78)
External Finish	High-gloss polyester powder coated	
Coil Type	Cross Fin (Aluminum Plate Fin and Copper Tube)	

Fan		
Type x Quanity	Sirocco fan x 1	
Airflow rate (Low - Mid - High)	CFM	1,040 - 1,262 - 1,485
External Static Pressure	In. WG	0.30 / 0.50 / 0.80 (Selectable)
Motor Type	DC motor	

Air Filter	Polypropylene Honeycomb

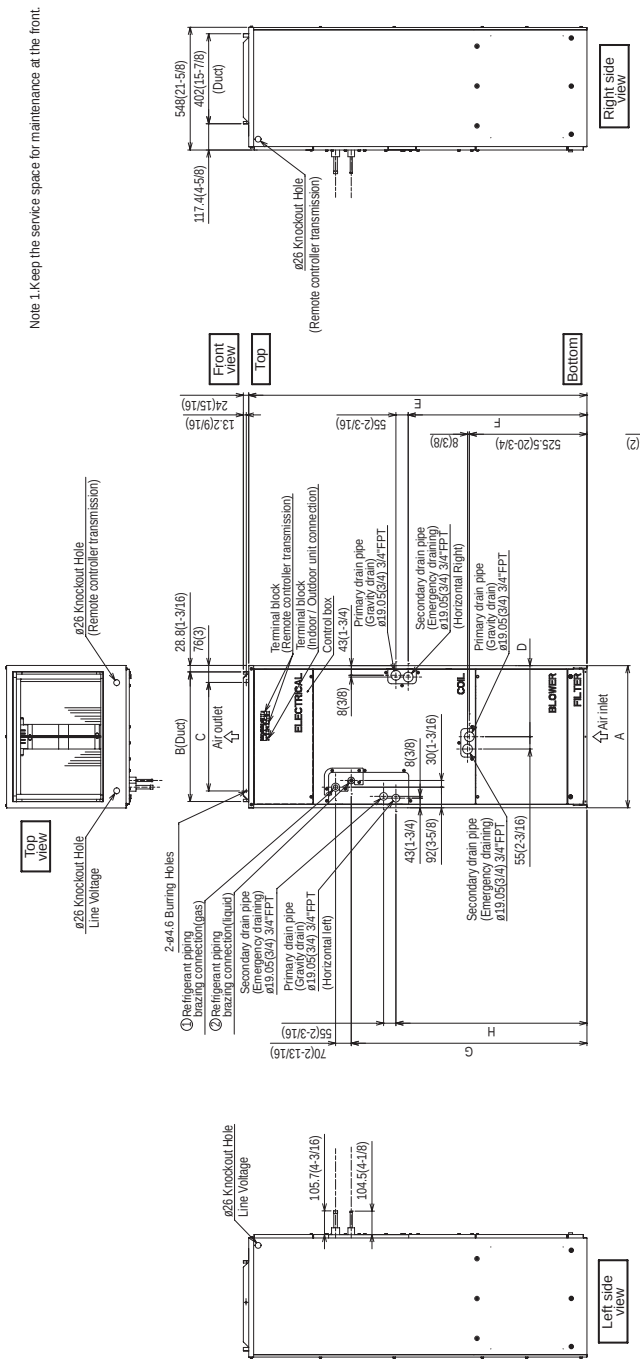
Refrigerant Piping Diameter		
Liquid (High Pressure)	In.(mm)	3/8 (9.52) Brazed
Gas (Low Pressure)	In.(mm)	5/8 (15.88) Brazed

Field Drain Pipe Size	In.(mm)	FPT 3/4 (19.05)

Sound Data (Low - Mid - High) (measured in anechoic room)		
Sound Pressure Level	dB(A)	36 - 40 - 44

Model: PVFY-P54NAMU-E – DIMENSIONS

Units: mm (in.)



Model	③Nominal Filter Size	Duct Connection
PVFY-P12NAMU-E	508×406.4×25.4 (20×16×1)	376×402 (14-13/16×15-7/8)
PVFY-P18NAMU-E		
PVFY-P24NAMU-E		
PVFY-P30NAMU-E	508×508×25.4 (20×20×1)	477×402 (18-13/16×15-7/8)
PVFY-P36NAMU-E		
PVFY-P48NAMU-E	508×609.6×25.4 (20×24×1)	579×402 (22-13/16×15-7/8)
PVFY-P54NAMU-E		

Unit:mm(in.)

Model	A	B	C	D	E	F	G	H	J	①Gas pipe	②Liquid pipe
PVFY-P12NAMU-E	432 (17)	376 (14-13/16)	281 (11-1/8)	224 (8-7/8)	1275 (50-1/4)	680 (26-13/16)	823 (32-7/16)	735.5 (29)	360 (14-3/16)	ø12.7 (1/2)	ø6.35 (1/4)
PVFY-P18NAMU-E											
PVFY-P24NAMU-E											
PVFY-P30NAMU-E	534 (21)	477 (18-13/16)	382.6 (15-1/8)	266.5 (10-1/2)	1378 (54-1/4)	737 (29-1/16)	953.5 (37-9/16)	792 (31-3/16)	461 (18-3/16)	ø15.88 (5/8)	ø9.52 (3/8)
PVFY-P36NAMU-E											
PVFY-P48NAMU-E	635 (25)	579 (22-13/16)	484.6 (19-1/8)	317.5 (12-1/2)	1511 (59-1/2)	798.5 (31-7/16)	1053 (41-1/2)	853.5 (33-5/8)	563 (22-3/16)		
PVFY-P54NAMU-E											

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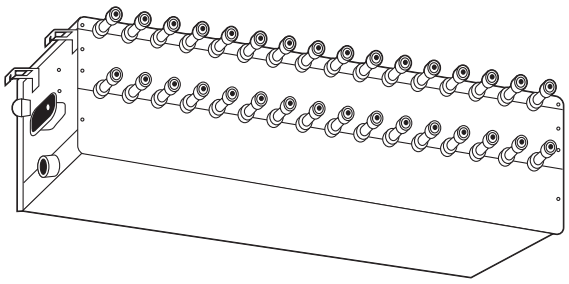
Form# PVFY-P54NAMU-E - 201503

CITY**MULTI**® Model: CMB-P1016NU-G MITSUBISHI ELECTRIC

Job Name:

Schedule Reference: | Date:



BC CONTROLLER FEATURES

- Used with R2-Series and WR2-Series outdoor units only
- Each branch supports 54,000 Btu/h or less
- Reducers are included for indoor units 18,000 Btu/h or less

OPTIONS

□ Joint Adapter (Port Connector).....CMY-R160C-J
■ Condensate Pump.....SI30-230

SPECIFICATIONS

Power
Power Source . . . . . 208 / 230V, 1 phase, 60Hz
Power Input
Cooling . . . . . 0.217 kW
Heating . . . . . 0.106 kW
Current
Cooling (208 / 230) . . . . . 1.04 / 0.94 A
Heating (208 / 230) . . . . . 0.51 / 0.46 A
Minimum Circuit Ampacity (MCA) (208 / 230) . . . . . 1.30 / 1.18 A
Maximum Overcurrent Protection (MOCP) . . . . . 15 A

External Finish . . . . . Galvanized Steel Plate

External Dimensions
Inches . . . . . 11-3/16 h x 43-1/4 w x 17 d
mm . . . . . 284 h x 1,098 w x 432 d

Net Weight . . . . . 138 lbs. / 62 kg

Number of Branches 16

Indoor Unit Capacity
Connectable to one Branch
- Model P54 or smaller
- Use optional port connector combining two branches when the total unit capacity exceeds 55,000 Btu/h. Use the reducer (standard accessory) when an indoor unit of 18,000 Btu/h or smaller is connected.

Refrigerant R410A

Refrigerant Piping Diameter
To Outdoor and Water-source Units
P72
High Pressure Pipe . . . . . 5/8" / 15.88 mm Brazed
Low Pressure Pipe . . . . . 3/4" / 19.05 mm Brazed

P96/P108
High Pressure Pipe . . . . . 3/4" / 19.05 mm Brazed
Low Pressure Pipe . . . . . 7/8" / 22.2 mm Brazed

P126
High Pressure Pipe . . . . . 3/4" / 19.05 mm Brazed
Low Pressure Pipe . . . . . 1-1/8" / 28.58 mm Brazed

To Indoor Unit
Liquid Pipe . . . . . 3/8" / 9.52 mm Flare
(1/4" / 6.35 mm with attached reducer used)

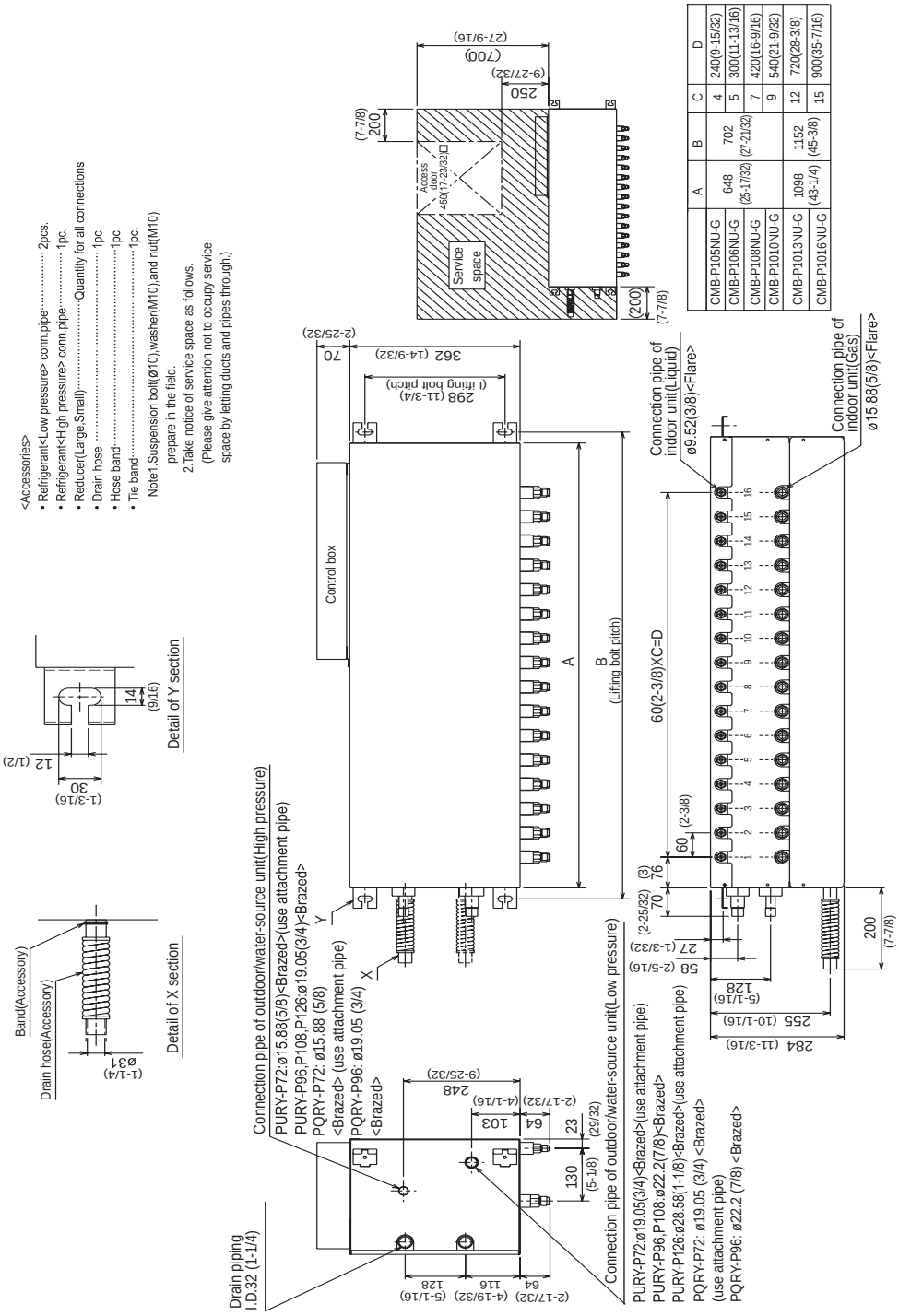
Gas Pipe . . . . . 5/8" / 15.88 mm Flare
(1/2" / 12.7 mm with attached reducer used,
3/4" / 19.05 mm and 7/8" / 22.2 mm
with optional port connector used)

Drainpipe . . . . . O.D. 1-1/4" / 32 mm

Notes:

Model: CMB-P1016NU-G – DIMENSIONS

Drw. : CMB-P-NU-G_W659644
Unit : mm(in)



	A	B	C	D
CMB-P105NU-G	648 (25-17/32)	702 (27-21/32)	4	240(9-15/32)
CMB-P106NU-G			5	300(11-13/16)
CMB-P108NU-G			7	420(16-9/16)
CMB-P1010NU-G			9	540(21-9/32)
CMB-P1013NU-G	1098 (43-1/4)	1152 (45-3/8)	12	720(28-3/8)
CMB-P1016NU-G			15	900(35-7/16)

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FORM# CMB-P1016NU-G - 201503

Concept Cost Plan

for

San Rafael No. 54- Option 1

June 22, 2015

1900 Powell Street, Suite 470
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ph: 510.595.3020
www.mack5.com

CONTENTS ***Page***

introduction

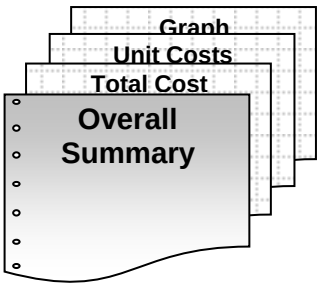
Mack[5] prepared a Conceptual Cost Plan for the proposed San Rafael Fire Station No. 54.

As a perspective, a Conceptual Cost Plan has the objective of identifying costs within an Order of Magnitude. The cost is not meant to be the lowest possible, rather, to identify the Order of Magnitude of costs in considering next steps.

The first part of the Report contains the basis of the report, the assumptions made, description of the project scope, the exclusions to the costs and a risk register which contain items that have potential to impact cost at some point in the future.

The Overall Summary section contains a Summary of Gross Floor Areas, an Overall Project Summary, and Component and Trade Cost Summaries with Graphs.

Each section contains Control Quantities, a Cost Summary and Graph, and a Detailed Breakdown of Costs.



project introduction

The project includes the renovation and addition to the existing Fire Station No. 54 in San Rafael.

items used for cost estimate

site visit	February
structural narrative	Cornerstone, undated
architectural program diagram	Mary McGrath Architects, undated
MEP narrative	Interface Engineering, 4/2/2015

assumptions

(a) Construction will start in June, 2015

(b) A construction period of 12 months

(c) The general contract will be competitively bid by a minimum of five qualified contractors

(d) The general contractor will have full access to the site during normal business hours

(e) The Owner furnishings and fixtures will be removed prior to construction commencing

(f) The Cost Plan assumes a prevailing wage project procured in a manner consistent with the public code

(g) Kitchen cabinets, countertops and equipment are reused.

inclusions

foundations	The Cost Plan allows for new foundations at new shear walls, and new slab on grade where access to below ground plumbing is required.

superstructure	The superstructure is predominantly wood framed with tilt up concrete walls at the apparatus bay. The entire superstructure will be strengthened. Isolated pockets of rotted wood members are replaced.
enclosure	The Cost Plan allows for new windows and refinishing of existing to remain. Windows are aluminum, dual glazed with some operable units.
roofing	Both levels of the station receive new roofing. The apparatus bay receives new rigid insulation over new plywood over existing plank members. The lower roof receives new roofing over new plywood.
interior construction	There is modest amount of work for the existing partitioning including new shear walls and partitions to accommodate the new floor plan.
interior finishes	Wall finishes are predominantly painted gypsum wallboard. Ceramic tile will be used in restrooms. Floor finishes include sheet linoleum, ceramic tile and carpet. The Apparatus portion gets sealed. Ceilings are painted Gypsum board.
plumbing	Plumbing scope of work includes all new fixtures, hose bibbs, floor and trench drains with associated waste, vent, hot and cold water piping, gas water heaters and condensate drains.
heating, ventilation, and air-conditioning	HVAC scope of work includes variable refrigerant volume multi-split systems with outdoor units, branch controllers, refrigerant lines, exhaust fans, kitchen and laundry exhaust ducts, controls, testing & balancing. The existing vehicle exhaust system is to be reused. The apparatus bay gets a new gas fired space heater.
fire protection	Automatic wet pipe sprinkler systems is included for the entire station.

electrical	The Cost Plan allows for all new electrical including new service, equipment power and distribution, lighting and associated controls, fire and life safety systems, user convenience power and data telecommunications. The Cost Plan includes an emergency generator.
equipment	Equipment includes, toilet partitions and accessories, shelving and millwork, blinds, visual displays, appliances and special use equipment.
site preparation	The site is prepared by removing the existing paving and miscellaneous clearing. The site will be graded to drain.
site improvement	Site improvements include retaining walls, new paving and landscaped areas.
site mechanical utilities	Site mechanical utilities include domestic and fire water supply mains, and storm drainage.
site electrical utilities	The Site Electrical allows for an emergency generator and switchgear, site lighting and service to the facility.

exclusions

(a) Hazardous material handling, disposal and abatement other than specifically noted

(b) Cost escalation beyond a midpoint of December, 2015

(c) Compression of schedule, premium or shift work, and restrictions on the contractor's working hours

(d) Project Soft Costs

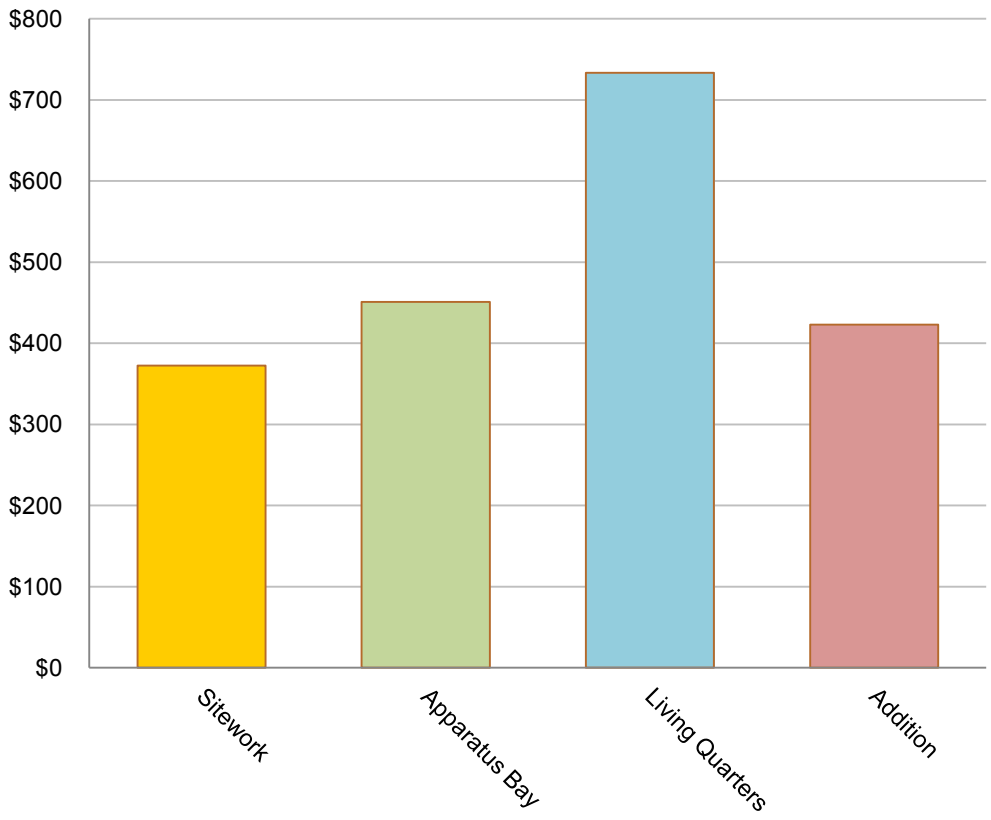
(e) Structural upgrades related to liquefaction

(f) Removal of Owner furnishings, equipment and fixtures

(g) Temporary housing of personnel

(h) Any liquefaction requirements

San Rafael No. 54- Option 1	*GFA*	*%*	*$/SF*	*$,000*
Living Quarters	2,549	37%	$287.81	$734
Apparatus Bay	1,897	23%	$237.80	$451
Sitework	7,794	19%	$47.78	$372
Addition	900	21%	$469.82	$423
			TOTAL CONSTRUCTION & SITEWORK:	**$1,980**



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Concept Cost Plan

Living Quarters

San Rafael No. 54- Option 1

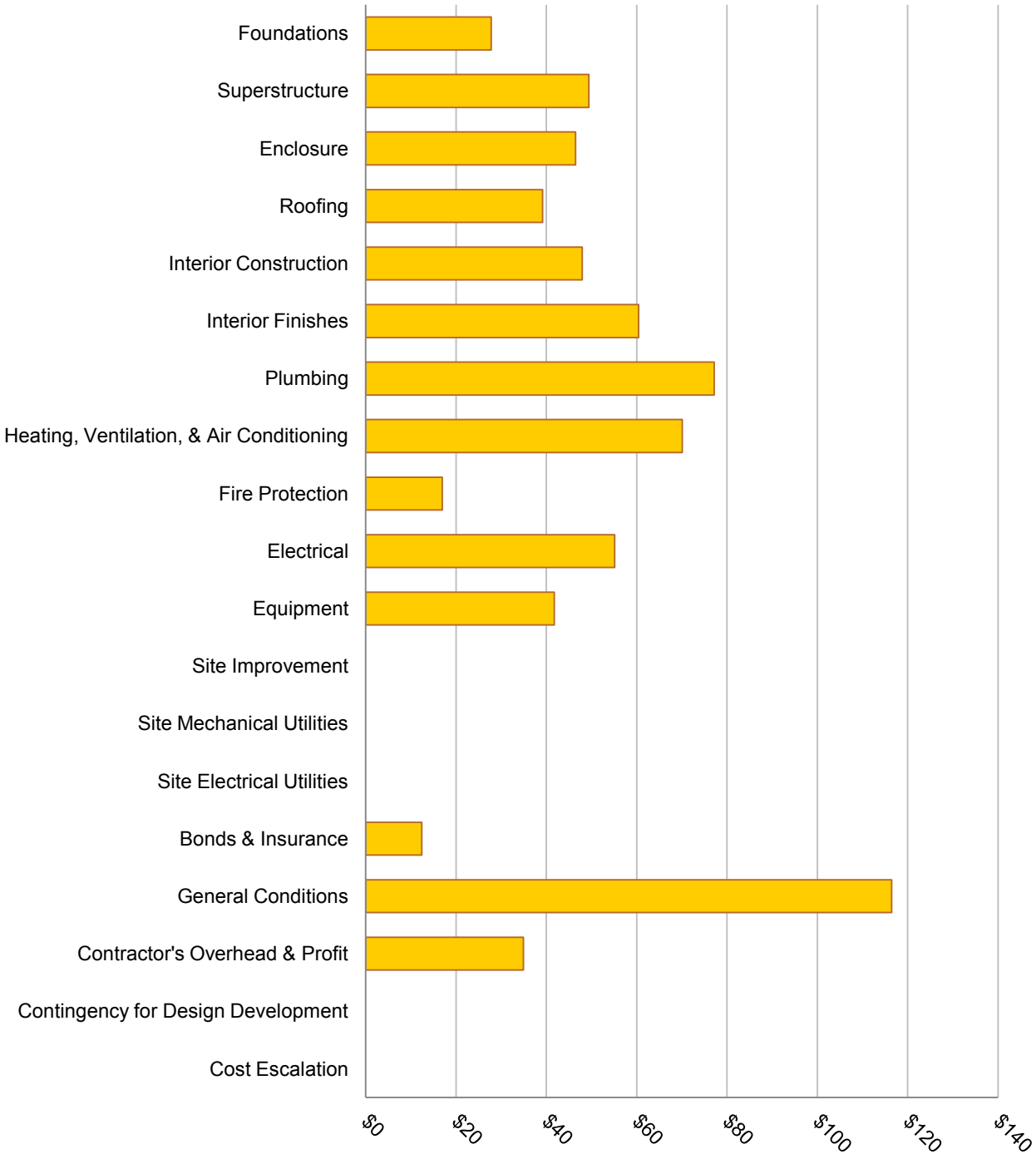
Living Quarters Summary
Detailed Cost Breakdown

June 22, 2015

UniFormat Summary	*2,603 SF*	*%*	*$/SF*	*$,000*
Foundations		4%	$10.67	$28
Superstructure		7%	$18.99	$49
Enclosure		6%	$17.86	$46
Roofing		5%	$15.04	$39
Interior Construction		7%	$18.41	$48
Interior Finishes		8%	$23.21	$60
Plumbing		11%	$29.64	$77
Heating, Ventilation, & Air Conditioning		10%	$26.94	$70
Fire Protection		2%	$6.50	$17
Electrical		8%	$21.17	$55
Equipment		6%	$16.04	$42
Selective Building Demolition		5%	$14.44	$38
Subtotal - Building Construction		*78%*	*$218.91*	*$570*
Total - Building and Sitework Construction		*78%*	*$218.91*	*$570*
Bonds & Insurance	2.2%	2%	$4.76	$12
General Conditions		16%	$44.73	$116
Contractor's Overhead & Profit	5.0%	5%	$13.42	$35
Subtotal		*100%*	*$281.83*	*$734*
Contingency for Design Development		0%	$0.00	$0
Cost Escalation		0%	$0.00	$0
TOTAL CONSTRUCTION BUDGET		***100%***	***$281.83***	***$734***

NOTE: Inclusions and Exclusions listed in the Commentary Section.

UniFormat Summary



FOUNDATIONS	Quantity	Unit	Rate	Total ($)
Reinforced Concrete including Excavation				
Shear wall footings, 30" x 24", 250#/CY reinforcing	40	LF	$110.00	$4,400
Slab on Grade, 6"				
Structural	120	SF	$15.00	$1,800
Plumbing	152	SF	$15.00	$2,280
Allow for epoxy dowels	224	EA	$75.00	$16,800
Hold downs, epoxy into existing foundation	20	EA	$125.00	$2,500
Subtotal For Foundations:				**$27,780**

SUPERSTRUCTURE	Quantity	Unit	Rate	Total ($)
Vertical Structure				
Wood Stud Framing and Sheathing				
2 x 4 at 16" o.c., with 1/2" sheathing	560	SF	$9.15	$5,124
Plywood at existing framing	560	SF	$4.50	$2,520
Allow for new partitions	100	LF	$72.25	$7,225
Flat Roofs				
Re-sheath	3,387	EA	$4.50	$15,243
Collectors from walls to roof	12	EA	$850.00	$10,200
Miscellaneous				
Hardware	2,603	SF	$2.50	$6,507
Pick up framing	2,603	SF	$1.00	$2,603
Subtotal For Superstructure:				**$49,422**

ENCLOSURE	Quantity	Unit	Rate	Total ($)
Exterior Walls				
Wall Framing, Furring and Insulation				
Insulation	1,560	SF	$1.15	$1,794
Gypsum wallboard at interior face of exterior wall	1,560	SF	$3.75	$5,850
Applied Exterior Finishes				
Minor repair and paint existing walls	1,560	SF	$1.15	$1,794

Soffits				
Paint soffits	785	SF	$3.00	$2,354
Exterior Windows and Louvers				NIC
Replace windows with dual glaze, low e	455	SF	$75.00	$34,162
Exterior Doors, Frames and Hardware				
Paint	6	EA	$90.00	$540
Subtotal For Enclosure:				**$46,493**

ROOFING	Quantity	Unit	Rate	Total ($)
Insulation				
Batt insulation, R-30 on underside	2,603	SF	$1.50	$3,904
Roofing	2,603	SF	($11.97	
Dens Deck roof board, 5/8"	2,603	SF	$2.50	$6,507
Vapor barrier	2,603	SF	$1.00	$2,603
Single ply roofing	2,603	SF	$8.00	$20,822
Gutters and downspouts	236	LF	$22.50	$5,310
Subtotal For Roofing:				**$39,146**

INTERIOR CONSTRUCTION	Quantity	Unit	Rate	Total ($)
Interior Partitions				
Insulation	2,443	SF	$0.85	$2,077
Gypsum wallboard, painted	4,886	SF	$4.75	$23,209
Interior Doors, Frames and Hardware				
Wood, Single leaf	10	EA	$1,685.00	$17,625
Wood, Double leaf	2	PR	$2,500.00	$5,000
Subtotal For Interior Construction:				**$47,910**

INTERIOR FINISHES	Quantity	Unit	Rate	Total ($)
Walls				
Ceramic tile	366	SF	$20.00	$7,320
Floors				
Sheet linoleum	350	SF	$12.00	$4,200
Ceramic tile	445	SF	$22.50	$10,001
Carpet	1,808	SF	$6.50	$11,754
Bases				
Rubber	645	LF	$3.50	$2,257
Wood, painted	100	LF	$15.00	$1,500
Ceramic	60	LF	$23.00	$1,380

Ceilings				
Acoustic batt insulation	2,603	SF	$1.10	$2,863
Gypsum wallboard, painted	2,603	SF	$7.35	$19,131
			Subtotal For Interior Finishes:	**$60,406**

PLUMBING	Quantity	Unit	Rate	Total ($)
Sanitary Fixtures & Connection Piping				
Sanitary fixtures	11	EA	$3,500.00	$38,500
Icemaker supply box				NIC
Dishwasher connections				NIC
Clothes washer supply/drain box	2	EA	$250.00	$500
Hose bibb - interior	2	EA	$200.00	$400
Hose bibb - exterior	2	EA	$450.00	$900
Plumbing Equipment				
Water heater, propane, 100 gal.	1	EA	$4,500.00	$4,500
Water meter, to 2"	1	EA	$1,600.00	$1,600
Sanitary Waste & Vent Systems				
Floor drain with piping	5	EA	$1,500.00	$7,500
Waste & vent rough-in for fixture	11	EA	$1,000.00	$11,000
Domestic Water Systems				
Backflow preventer, RP type, 2"	1	EA	$1,500.00	$1,500
Trap primer & TP lines (at FDs)	5	EA	$500.00	$2,500
Natural Gas Systems				
Gas to water heater	1	EA	$1,800.00	$1,800
Gas to (e) range/oven, allowance	1	EA	$1,250.00	$1,250
Gas to clothes dryers	3	EA	$900.00	$2,700
Trade Specialties				
Sleeves, firestopping, pipe ID	1	LS	$750.00	$750
Testing, cleaning & disinfection	1	LS	$750.00	$750
Miscellaneous	1	LS	$1,000.00	$1,000
			Subtotal For Plumbing:	**$77,150**

HEATING, VENTILATION, & AIR-CONDITIONING	Quantity	Unit	Rate	Total ($)
VRF Multi-Split Systems				
Ducted	2,603	SF	$22.00	$57,262
Air Distribution and Return				
Kitchen hood exhaust duct	1	EA	$500.00	$500
Dryer vents	2	EA	$250.00	$500
Controls and Instrumentation				
VRV controls - DDC	1	LS	$7,500.00	$7,500
Exhaust fan control w/ lights	4	EA	$200.00	$800
Testing and Balancing				
Systems testing & balancing	10	HR	$130.00	$1,300
Trade Demolition & Specialties				
Firestopping, sleeves, etc.	1	LS	$750.00	$750
Miscellaneous	1	LS	$1,500.00	$1,500
Subtotal For Heating, Ventilation, & Air-Conditioning:				**$70,112**

FIRE PROTECTION	Quantity	Unit	Rate	Total ($)
Automatic wet sprinkler systems				
Wet sprinklers - complete, includes exterior soffit	2,603	SF	$6.50	$16,918
Subtotal For Fire Protection:				**$16,918**

ELECTRICAL	Quantity	Unit	Rate	Total ($)
Electrical service and distribution				
Equipment wiring	2,603	SF	$2.00	$5,206
Lighting	2,603	SF	$8.00	$20,822
Lighting controls	2,603	SF	$1.00	$2,603
Branch devices and circuitry	2,603	SF	$3.50	$9,110
Fire Alarm system	2,603	SF	$2.50	$6,507

Telecommunications	2,603	SF	$3.00	$7,808
Security				NIC
Other electrical systems				
Demolition work	1	LS	$1,500.00	$1,500
Seismic restraints	1	LS	$800.00	$800
Temporary power & lighting	1	LS	$750.00	$750
			Subtotal For Electrical:	**$55,106**

EQUIPMENT	Quantity	Unit	Rate	Total ($)
Protective Guards, Barriers				
Allow for corner guards, etc.	1	LS	$1,500.00	$1,500
Prefabricated Compartments and Accessories				
Toilet Partitions and Accessories				
Grab bars	2	EA	$115.00	$230
Grab bar, shower 90 degree	1	EA	$310.00	$310
Toilet paper dispenser	2	EA	$85.00	$170
Feminine napkin disposal	2	EA	$135.00	$270
Seat cover dispenser	2	EA	$165.00	$330
Soap dispenser	4	EA	$110.00	$440
Mirror	3	EA	$337.00	$1,011
Paper towel dispenser and disposal	3	EA	$850.00	$2,550
Shower door	2	EA	$350.00	$700
Miscellaneous items	1	LS	$750.00	$750
Shelving and Millwork				
Storage shelving	20	LF	$17.50	$350
Janitor shelf and mop rack	1	EA	$1,500.00	$1,500
Cabinets and Countertops				
Kitchen				
Base cabinets with countertops				NIC
Dorm rooms				
Wardrobe cabinets	20	EA	$850.00	$17,000

Toilet Countertops				
Metal support, solid surface countertops in toilets	9	LF	$500.00	$4,500
Light Control and Vision Equipment				
Window blinds	455	SF	$15.00	$6,832
White board				NIC
Signage	2,603	SF	$1.00	$2,603
Flat screen television, 42" with support				NIC
Special Use Equipment				
Refrigerator				NIC
Dishwasher				NIC
Stove w/ exhaust hood, Ansel system				NIC
Washer				NIC
Dryer				NIC
Amenities and Convenience Items				
Walk off mats, including recess				NIC
Fire extinguishers	2	EA	$350.00	$700
Subtotal For Equipment:				**$41,746**

SELECTIVE BUILDING DEMOLITION	Quantity	Unit	Rate	Total ($)
Building Demolition				
Interior finishes including floor finishes, gypsum wallboard, ceilings, tile, etc.	2,603	SF	$4.50	$11,713
Roofing	2,603	SF	$0.85	$2,212
Slab on grade	120	SF	$12.50	$1,500
Wood framed structure	40	LF	$7.50	$300
Sanitary fixtures, plumbing	2,603	SF	$3.00	$7,808
Electrical	2,603	SF	$2.50	$6,507
Windows	455	SF	$8.00	$3,644
Miscellaneous	2,603	SF	$1.50	$3,904
Hazardous Materials Abatement				NIC
Subtotal For Selective Building Demolition:				**$37,589**

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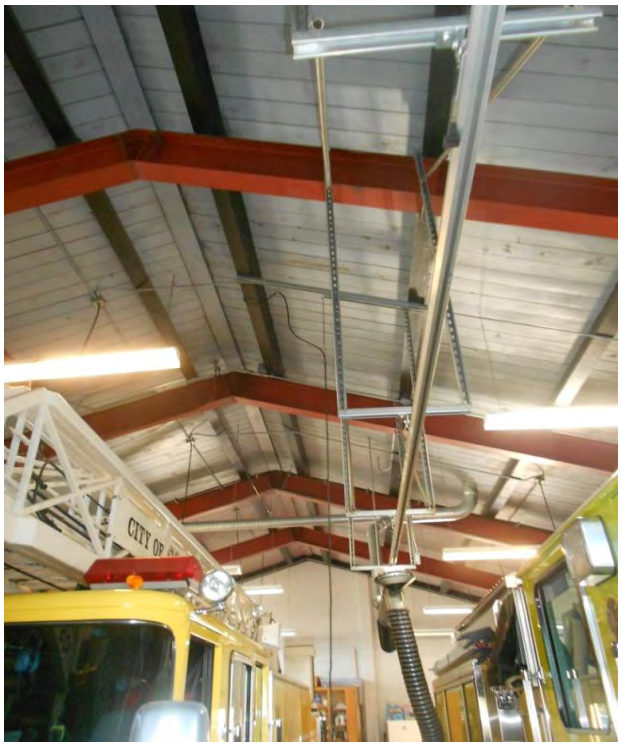


Concept Cost Plan

Apparatus Bay

San Rafael No. 54- Option 1

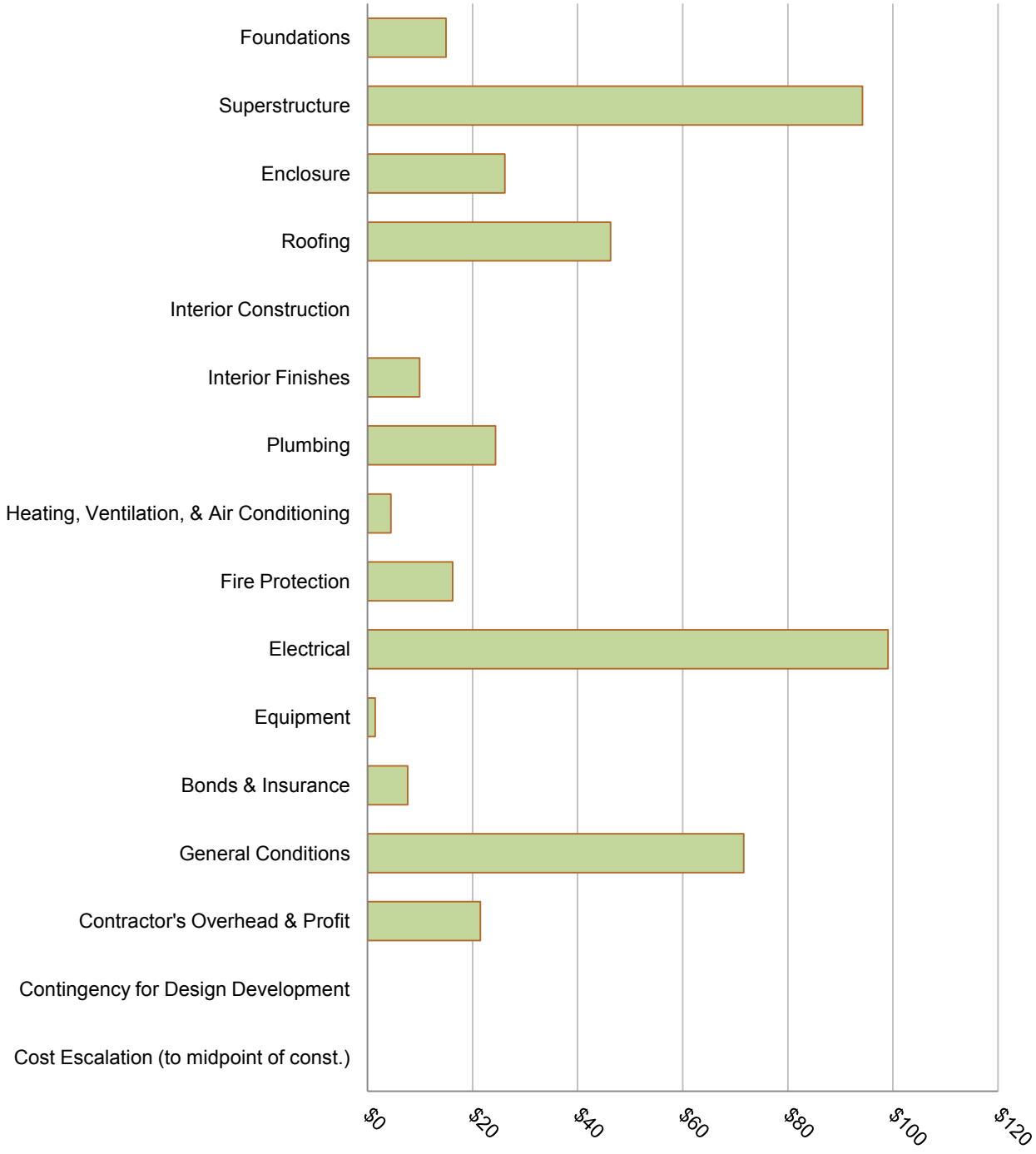
Control Quantities
Apparatus Bay Summary
Detailed Cost Breakdown

June 22, 2015

CSI UniFormat Summary	*1,897 SF*	*%*	*$/SF*	*$,000*
Foundations		3%	$7.89	$15
Superstructure		21%	$49.65	$94
Enclosure		6%	$13.79	$26
Roofing		10%	$24.38	$46
Interior Construction		0%	$0.00	$0
Interior Finishes		2%	$5.24	$10
Plumbing		5%	$12.84	$24
Heating, Ventilation, & Air Conditioning		1%	$2.36	$4
Fire Protection		4%	$8.55	$16
Electrical		22%	$52.21	$99
Equipment		0%	$0.76	$1
Selective Building Demolition		3%	$7.05	$13
Subtotal - Building Construction		*78%*	*$184.71*	*$350*
Site Preparation		0%	$0.00	$0
Site Improvement		0%	$0.00	$0
Site Mechanical Utilities		0%	$0.00	$0
Site Electrical Utilities		0%	$0.00	$0
Subtotal - Sitework		*0%*	*$0.00*	*$0*
Total - Building and Sitework Construction		*78%*	*$184.71*	*$350*
Bonds & Insurance	2.2%	2%	$4.02	$8
General Conditions		16%	$37.75	$72
Contractor's Overhead & Profit	5.0%	5%	$11.32	$21
Subtotal		*100%*	*$237.80*	*$451*
Contingency for Design Development	0.0%	0%	$0.00	$0
Cost Escalation (to midpoint of const.)	0.0%	0%	$0.00	$0
TOTAL CONSTRUCTION BUDGET		***100%***	***$237.80***	***$451***

NOTE: Inclusions and Exclusions listed in the Commentary Section.

CSI UniFormat Summary



FOUNDATIONS	Quantity	Unit	Rate	Total ($)
Spread Footings, including excavation				
Allow for new footing	32	LF	$175.00	$5,600
Slab on Grade, 6"	308	SF	$15.00	$4,620
Miscellaneous				
Allow for miscellaneous items	1,897	SF	$2.50	$4,743
			Subtotal For Foundations:	**$14,963**

SUPERSTRUCTURE	Quantity	Unit	Rate	Total ($)
Vertical Structure				
Strong back columns at both ends	4	EA	$3,500.00	$14,000
Strong back columns at concrete panels at windows	5	EA	$3,500.00	$17,500
Shear Elements				
Shotcrete at high bay windows, including epoxy dowels to existing and waterproofing	150	SF	$75.00	$11,250
Brace frame at Apparatus Bay door	1	LS	$25,000.00	$25,000
Roofs				
Re-sheath roof	2,500	SF	$4.50	$11,251
Replace water damaged roofing, 15% of roof area	375	SF	$15.00	$5,625
Collector ties	4	EA	$850.00	$3,400
Miscellaneous				
Hardware and misc connections	1,897	SF	$2.50	$4,743
Pick up framing	1,897	SF	$0.75	$1,423
			Subtotal For Superstructure:	**$94,192**

ENCLOSURE	Quantity	Unit	Rate	Total ($)
Exterior Walls				
Applied Exterior Finishes				
Paint existing concrete	2,730	SF	$1.75	$4,778
Miscellaneous	1,897	SF	$1.00	$1,897
Soffits				
Paint soffits	599	SF	$3.00	$1,797
Replace facia board, 2 x	207	LF	$17.50	$3,628
Paint facia board, 2 x	207	LF	$5.50	$1,140
Exterior Windows and Louvers				
Aluminum, low-E	150	SF	$75.00	$11,250
Exterior Doors, Frames and Hardware				
Refinish existing roll up doors	2	EA	$750.00	$1,500
Paint doors	2	EA	$90.00	$180
			Subtotal For Enclosure:	**$26,169**

ROOFING	Quantity	Unit	Rate	Total ($)
Roofing	2,500	SF	($18.50	
Rigid insulation, R-30, 6"	2,500	SF	$6.00	$15,001
Dens Deck roof board, 5/8"	2,500	SF	$2.50	$6,251
Vapor barrier	5,000	SF	$1.00	$5,000
Single ply roofing	2,500	SF	$8.00	$20,002
			Subtotal For Roofing:	**$46,254**

INTERIOR CONSTRUCTION	Quantity	Unit	Rate	Total ($)
Interior Partitions				
No work anticipated				NIC
			Subtotal For Interior Construction:	

INTERIOR FINISHES	Quantity	Unit	Rate	Total ($)
Floors				
Concrete sealer	1,897	SF	$1.00	$1,897
Bases				
Paint	183	LF	$2.50	$457
Ceilings				
Paint exposed elements	1,897	SF	$4.00	$7,589
			Subtotal For Interior Finishes:	**$9,943**

PLUMBING	Quantity	Unit	Rate	Total ($)
Sanitary Fixtures & Connection Piping	1,897	SF	$3.50	$6,640
Domestic Water Systems	1,897	SF	$1.00	$1,897
Natural Gas Systems				
Gas to space heater	1	EA	$1,200.00	$1,200
Compressed Air Systems				
Air compressor, dryer, filters	1	LS	$3,500.00	$3,500
Compressed air piping, to 3/4"	75	LF	$35.00	$2,625
Quick disconnect with drop	1	EA	$350.00	$350
CA hose reel - retractable	2	EA	$750.00	$1,500
Rainwater Drainage System				
Roof & overflow drainage system	1,897	SF	$2.00	$3,794
Trade Specialties				
Sleeves, firestopping, pipe ID	1	LS	$750.00	$750
Testing, cleaning & disinfection	1	LS	$600.00	$600
Miscellaneous	1	LS	$1,500.00	$1,500
			Subtotal For Plumbing:	**$24,357**

HEATING, VENTILATION, & AIR-CONDITIONING	Quantity	Unit	Rate	Total ($)
VRV Multi-Split Systems, ducted and unducted				NIC
Air Handling Equipment				
Vehicle exhaust system -reused				NIC
Unit heater, suspended type	1	EA	$2,200.00	$2,200
Testing and Balancing				
Systems balancing	4	HR	$130.00	$520
Trade Demolition & Specialties				
Firestopping, sleeves, etc.	1	LS	$250.00	$250
Miscellaneous	1	LS	$1,500.00	$1,500
Subtotal For Heating, Ventilation, & Air-Conditioning:				**$4,470**

FIRE PROTECTION	Quantity	Unit	Rate	Total ($)
Automatic wet sprinkler systems				
Wet sprinklers - complete, includes exterior soffit	2,496	SF	$6.50	$16,225
Subtotal For Fire Protection:				**$16,225**

ELECTRICAL	Quantity	Unit	Rate	Total ($)
Electrical service and distribution (service is for the entire station)				
Service and Distribution				
400A distribution panelboard	1	EA	$12,000.00	$12,000
Associated panelboards and feeders	5,400	SF	$3.00	$16,200
Emergency power transfer switch	5,400	SF	$0.75	$4,050
Connection to 100KW generator (See Site Development)	1	LS	$5,000.00	$5,000
Associated panelboards and feeders	5,400	SF	$1.50	$8,100
Equipment wiring	1,897	SF	$2.00	$3,794
Lighting	1,897	SF	$8.00	$15,178

Lighting controls	1,897	SF	$1.00	$1,897
Branch devices and circuitry	1,897	SF	$3.50	$6,640
Fire Alarm system	1,897	SF	$2.50	$4,743
Telecommunications	1,897	SF	$3.00	$5,692
Security				NIC
Dispatch/Antenna:				
Rough-in only	1	LS	$7,500.00	$7,500
Other electrical systems				
Demolition work	1	LS	$2,500.00	$2,500
Seismic restraints	1	LS	$5,000.00	$5,000
Temporary power & lighting	1	LS	$750.00	$750
			Subtotal For Electrical:	**$99,044**

EQUIPMENT	Quantity	Unit	Rate	Total ($)
Shelving and Millwork				
Allow for storage shelving	50	LF	$15.00	$750
Cabinets and Countertops				
Work bench				NIC
Lockable cabinets				NIC
Wardrobe cabinets				NIC
Light Control and Vision Equipment				
Window blinds				NIC
Amenities and Convenience Items				
Walk off mats, including recess				NIC
Fire extinguishers	2	EA	$350.00	$700
			Subtotal For Equipment:	**$1,450**

SELECTIVE BUILDING DEMOLITION	Quantity	Unit	Rate	Total ($)
Building Demolition				
Slab on Grade, 6"	404	SF	$6.00	$2,424
Windows	150	SF	$5.00	$750
Roofing, sheetmetal	1,897	SF	$1.00	$1,897
Roof sheathing	1,897	SF	$0.75	$1,423
Remove water damaged roofing, 15% of roof area	285	SF	$7.50	$2,134
Miscellaneous	1,897	SF	$2.50	$4,743
Hazardous materials abatement				NIC
Subtotal For Selective Building Demolition:				**$13,371**

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Concept Cost Plan

Sitework

San Rafael No. 54- Option 1

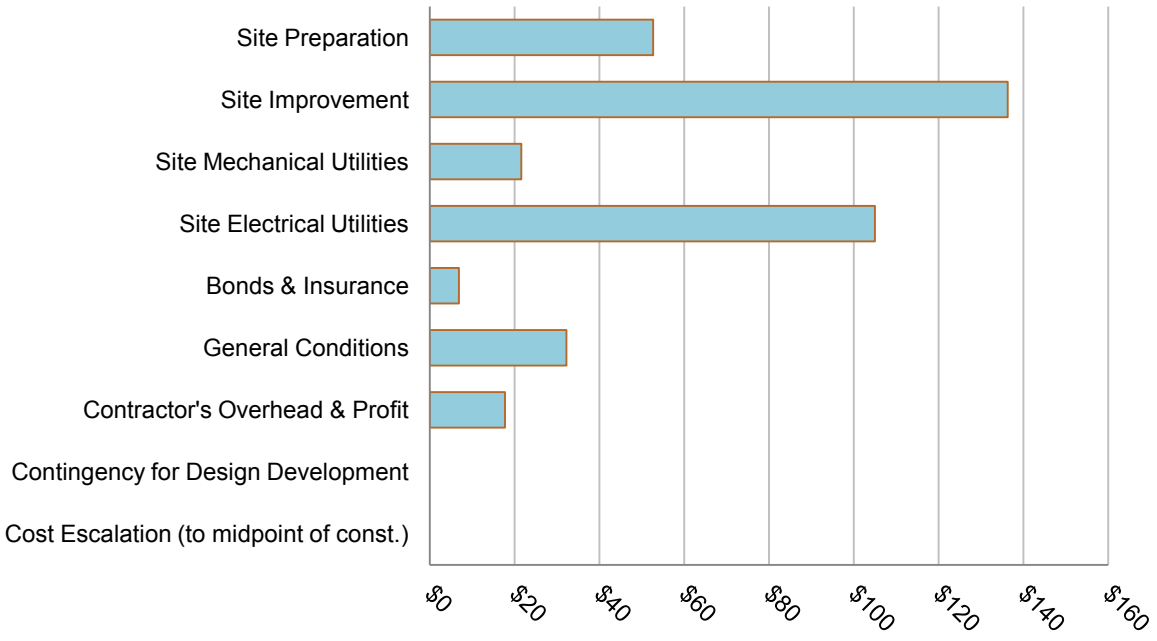
Control Quantities
Sitework Summary
Detailed Cost Breakdown

June 22, 2015

CSI UniFormat Summary	*7,794 SF*	*%*	*$/SF*	*$,000*
Site Preparation		14%	$6.76	$53
Site Improvement		37%	$17.48	$136
Site Mechanical Utilities		6%	$2.77	$22
Site Electrical Utilities		28%	$13.47	$105
Subtotal - Sitework		*85%*	*$40.48*	*$316*
Total - Building and Sitework Construction		*85%*	*$40.48*	*$316*
Bonds & Insurance	2.2%	2%	$0.88	$7
General Conditions		9%	$4.14	$32
Contractor's Overhead & Profit	5.0%	5%	$2.28	$18
Subtotal		*100%*	*$47.78*	*$372*
Contingency for Design Development		0%	$0.00	$0
Cost Escalation (to midpoint of const.)		0%	$0.00	$0
TOTAL CONSTRUCTION BUDGET		***100%***	***$47.78***	***$372***

NOTE: Inclusions and Exclusions listed in the Commentary Section.

CSI UniFormat Summary



SITE PREPARATION	Quantity	Unit	Rate	Total ($)
Site Clearing and Demolition				
Concrete paving	1,641	SF	$1.85	$3,035
Asphalt paving	4,509	SF	$1.00	$4,491
Clear and grubb vegetation	2,544	SF	$0.50	$1,272
Allowance for SWPPP	1	LS	$25,000.00	$25,000
Allowance for miscellaneous	1	LS	$10,000.00	$10,000
Earthwork				
New grading, cut/fill as required for drainage, removed from site	161	CY	$55.00	$8,855
Hazardous materials abatement				
Assume none required				NIC
			Subtotal For Site Preparation:	**$52,653**

SITE IMPROVEMENT	Quantity	Unit	Rate	Total ($)
Vehicular and Pedestrian Paving				
Concrete paving	1,641	SF	$10.00	$16,405
Asphalt paving	4,509	SF	$6.50	$29,310
Allow for curbs	1	LS	$5,000.00	$5,000
Site Structures				
Allow for new retaining walls at rear of site, <=3'	166	LF	$195.00	$32,390
Drainage				
Allow for new area drains, sand/oil separator, connection to main	6,150	SF	$2.25	$13,837
Lighting				
Allow for new site lights in addition to existing	3	EA	$3,500.00	$10,500
Landscaping and Miscellaneous Items				
Clearing, topsoil amendment	2,544	SF	$1.00	$2,544
Landscaping	2,544	SF	$1.50	$3,816
Drainage	2,544	SF	$2.00	$5,089
Lighting, low level	2,544	SF	$0.65	$1,654

Fencing and Miscellaneous Accessories				
Chain link fencing and decorative fencing	242	LF	$65.00	$15,730
Subtotal For Site Improvement:				**$136,274**

SITE MECHANICAL UTILITIES	Quantity	Unit	Rate	Total ($)
Site Mechanical				
Sanitary sewer	40	LF	$135.00	$5,400
Storm drainage to main	40	LF	$135.00	$5,400
Potable water to main	40	LF	$135.00	$5,400
Fire water to main	40	LF	$135.00	$5,400
Subtotal For Site Mechanical Utilities:				**$21,600**

SITE ELECTRICAL UTILITIES	Quantity	Unit	Rate	Total ($)
Site Electrical				
Electric conduit to point of connection	1	LS	$5,000.00	$5,000
Allow for 100KW emergency generator, with ATS's, panelboards and feeders	1	LS	$100,000.00	$100,000
Subtotal For Site Electrical Utilities:				**$105,000**

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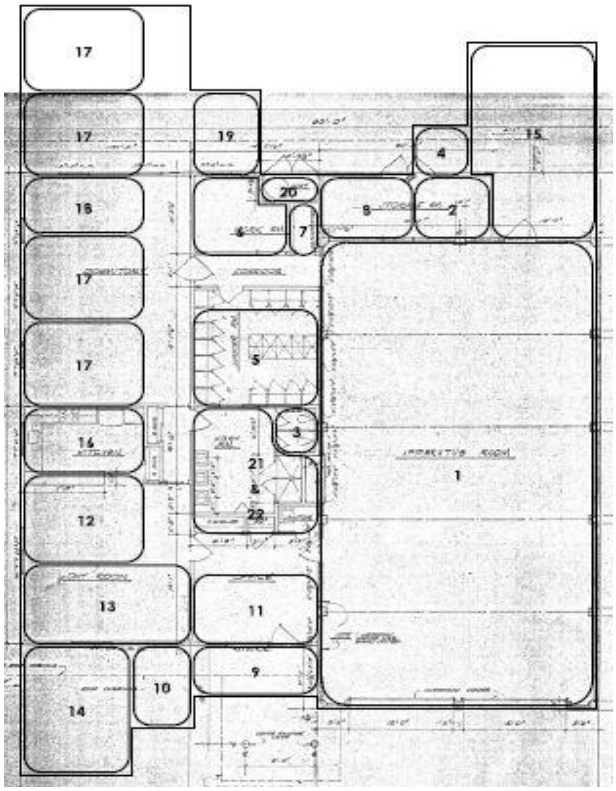


Concept Cost Plan

Addition

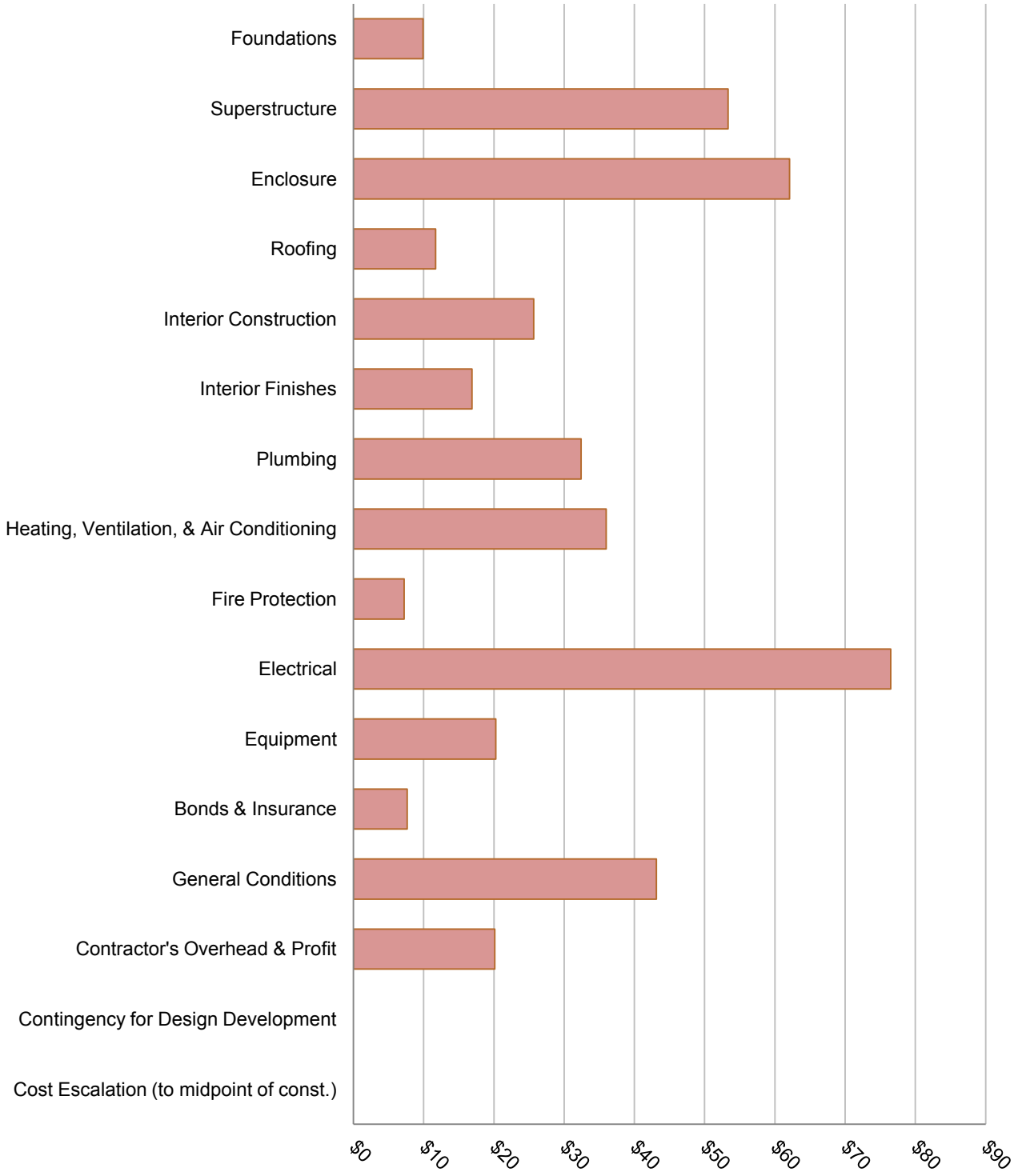
San Rafael No. 54- Option 1

June 22, 2015

CSI UniFormat Summary	*900 SF*	*%*	*$/SF*	*$,000*
Foundations		2%	$11.00	$10
Superstructure		13%	$59.25	$53
Enclosure		15%	$69.00	$62
Roofing		3%	$13.00	$12
Interior Construction		6%	$28.50	$26
Interior Finishes		4%	$18.75	$17
Plumbing		8%	$36.00	$32
Heating, Ventilation, & Air Conditioning		9%	$40.00	$36
Fire Protection		2%	$8.00	$7
Electrical		18%	$85.00	$77
Equipment		5%	$22.50	$20
Subtotal - Building Construction		*83%*	*$391.00*	*$352*
Total - Building and Sitework Construction		*83%*	*$391.00*	*$352*
Bonds & Insurance	2.2%	2%	$3.50	$8
General Conditions		10%	$18.60	$43
Contractor's Overhead & Profit	5.0%	5%	$3.50	$20
Subtotal		*100%*	*$469.82*	*$423*
Contingency for Design Development	0.0%	0%	$0.00	$0
Cost Escalation (to midpoint of const.)	0.0%	0%	$0.00	$0
TOTAL CONSTRUCTION BUDGET		***100%***	***$469.82***	***$423***

NOTE: Inclusions and Exclusions listed in the Commentary Section.

CSI UniFormat Summary



Concept Cost Plan

for

San Rafael No. 55- Option 1

June 22, 2015

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CONTENTS ***Page***

introduction

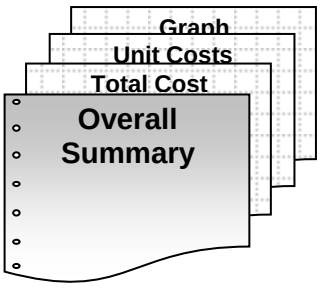
Mack[5] prepared a Conceptual Cost Plan for the proposed San Rafael Fire Station No. 55.

As a perspective, a Conceptual Cost Plan has the objective of identifying costs within an Order of Magnitude. The cost is not meant to be the lowest possible, rather, to identify the Order of Magnitude of costs in considering next steps.

The first part of the Report contains the basis of the report, the assumptions made, description of the project scope, the exclusions to the costs and a risk register which contain items that have potential to impact cost at some point in the future.

The Overall Summary section contains a Summary of Gross Floor Areas, an Overall Project Summary, and Component and Trade Cost Summaries with Graphs.

Each section contains Control Quantities, a Cost Summary and Graph, and a Detailed Breakdown of Costs.



project introduction

The project includes the renovation and addition to the existing Fire Station No. 55 in San Rafael.

items used for cost estimate

site visit	February
structural narrative	Cornerstone, undated
architectural program diagram	Mary McGrath Architects, undated
MEP narrative	Interface Engineering, 4/2/2015

assumptions

(a) Construction will start in June, 2015

(b) A construction period of 12 months

(c) The general contract will be competitively bid by a minimum of five qualified contractors

(d) The general contractor will have full access to the site during normal business hours

(e) The Owner furnishings and fixtures will be removed prior to construction commencing

(f) The Cost Plan assumes a prevailing wage project procured in a manner consistent with the public code

(g) Kitchen cabinets, countertops and equipment are reused.

inclusions

foundations	The Cost Plan allows for new foundations at new shear walls, and new slab on grade where access to below ground plumbing is required.

superstructure	The superstructure is predominantly wood framed with tilt up concrete walls at the apparatus bay. The entire superstructure will be strengthened. Isolated pockets of rotted wood members are replaced.
enclosure	The Cost Plan allows for new windows and refinishing of existing finishes to remain. Windows are aluminum, dual glazed with some operable units.
roofing	Both levels of the station receive new roofing. The apparatus bay receives new rigid insulation over existing concrete. The lower roof receives new roofing over re-nailed wood members.
interior construction	There is modest amount of work for the existing partitioning including new shear walls and partitions to accommodate the new floor plan.
interior finishes	Wall finishes are predominantly painted gypsum wallboard. Ceramic tile will be used in restrooms. Floor finishes include sheet linoleum, ceramic tile and carpet. The Apparatus portion gets sealed. Ceilings are painted Gypsum board.
plumbing	Plumbing scope of work includes all new fixtures, hose bibbs, floor and trench drains with associated waste, vent, hot and cold water piping, gas water heaters and condensate drains.
heating, ventilation, and air-conditioning	HVAC scope of work includes variable refrigerant multi-split systems with outdoor units, branch controllers, refrigerant lines, exhaust fans, kitchen and laundry exhaust ducts, controls, testing & balancing. The existing vehicle exhaust system is to be reused. The apparatus bay gets a new gas fired space heater.
fire protection	Automatic wet pipe sprinkler systems is included for the entire station.

electrical	The Cost Plan allows for all new electrical including new service, equipment power and distribution, lighting and associated controls, fire and life safety systems, user convenience power and data telecommunications. The Cost Plan includes an emergency generator.
equipment	Equipment includes, toilet partitions and accessories, shelving and millwork, blinds, visual displays, appliances and special use equipment.
site preparation	The site is prepared by removing the existing paving and miscellaneous clearing. The site will be graded to drain.
site improvement	Site improvements include retaining walls, new paving and landscaped areas.
site mechanical utilities	Site mechanical utilities include domestic and fire water supply mains, and storm drainage.
site electrical utilities	The Site Electrical allows for an emergency generator and switchgear, site lighting and service to the facility.

exclusions

(a) Hazardous material handling, disposal and abatement other than specifically noted

(b) Cost escalation beyond a midpoint of December, 2015

(c) Compression of schedule, premium or shift work, and restrictions on the contractor's working hours

(d) Project Soft Costs

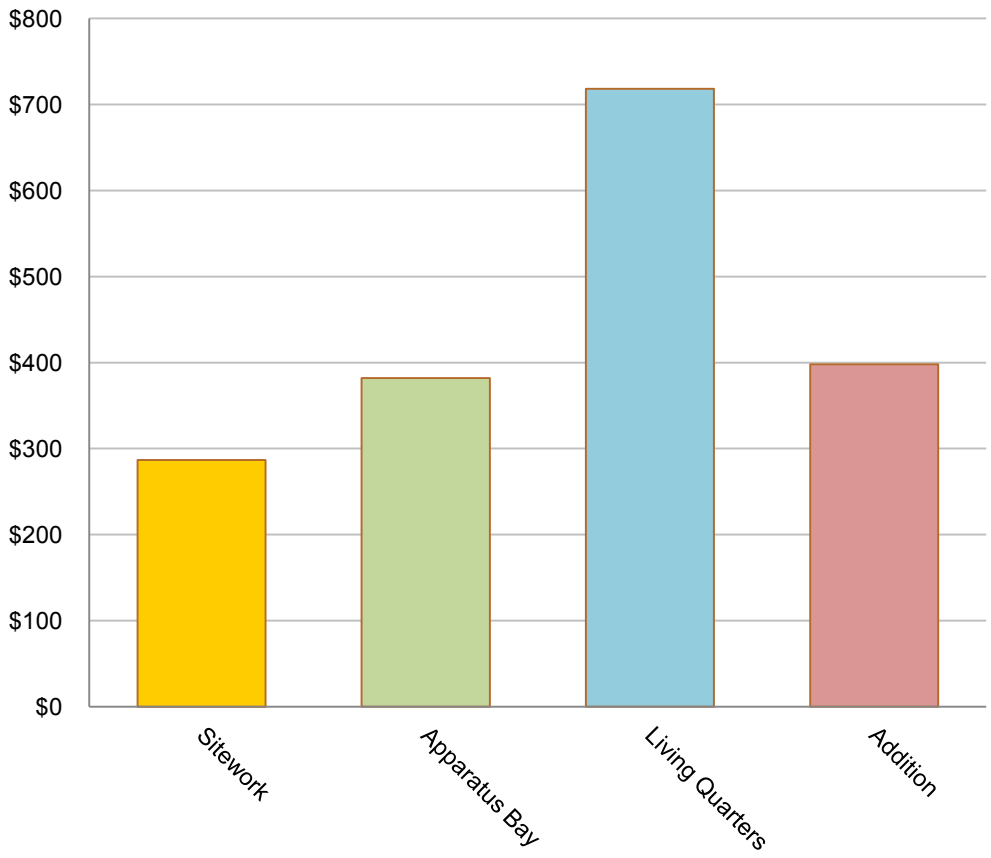
(e) Structural upgrades related to liquefaction

(f) Removal of Owner furnishings, equipment and fixtures

(g) Temporary housing of personnel

(h) Any liquefaction requirements

San Rafael No. 55- Option 1	*GFA*	*%*	*$/SF*	*$,000*
Living Quarters	2,549	40%	$281.85	$718
Apparatus Bay	1,897	21%	$201.27	$382
Sitework	7,794	16%	$36.78	$287
Addition	800	22%	$497.25	$398
			TOTAL CONSTRUCTION & SITEWORK:	**$1,785**



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Concept Cost Plan

Living Quarters

San Rafael No. 55- Option 1

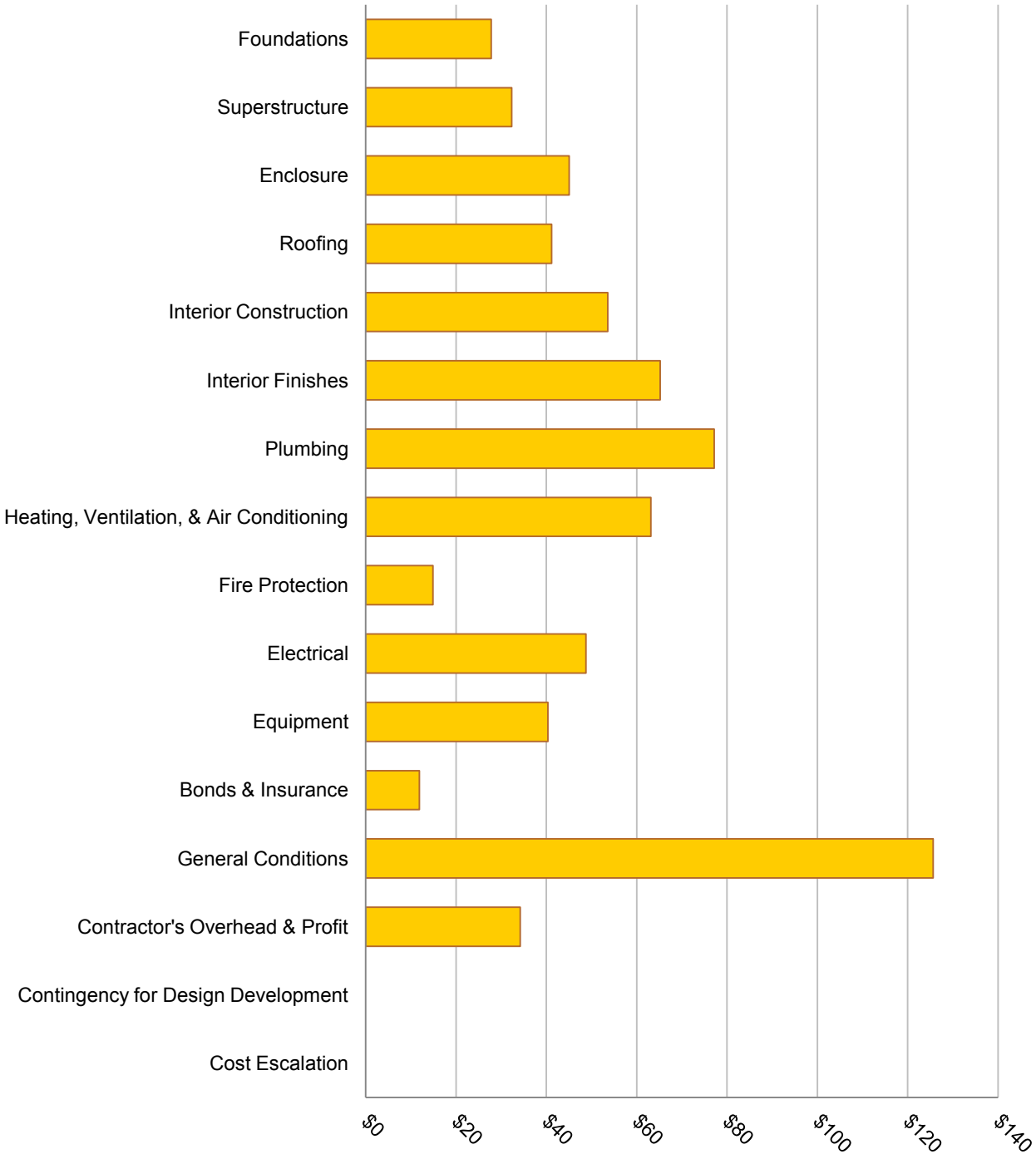
Living Quarters Summary
Detailed Cost Breakdown

June 22, 2015

UniFormat Summary	*2,287 SF*	*%*	*$/SF*	*$,000*
Foundations		4%	$12.15	$28
Superstructure		4%	$14.13	$32
Enclosure		6%	$19.70	$45
Roofing		6%	$18.00	$41
Interior Construction		7%	$23.44	$54
Interior Finishes		9%	$28.51	$65
Plumbing		11%	$33.74	$77
Heating, Ventilation, & Air Conditioning		9%	$27.62	$63
Fire Protection		2%	$6.50	$15
Electrical		7%	$21.33	$49
Equipment		6%	$17.64	$40
Selective Building Demolition		5%	$16.28	$37
Subtotal - Building Construction		*76%*	*$239.05*	*$547*
Total - Building and Sitework Construction		*76%*	*$239.05*	*$547*
Bonds & Insurance	2.2%	2%	$5.20	$12
General Conditions		17%	$54.96	$126
Contractor's Overhead & Profit	5.0%	5%	$14.96	$34
Subtotal		*100%*	*$314.17*	*$718*
Contingency for Design Development		0%	$0.00	$0
Cost Escalation		0%	$0.00	$0
TOTAL CONSTRUCTION BUDGET		***100%***	***$314.17***	***$718***

NOTE: Inclusions and Exclusions listed in the Commentary Section.

UniFormat Summary



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FOUNDATIONS	Quantity	Unit	Rate	Total ($)
Reinforced Concrete including Excavation				
Shear wall footings, 30" x 24", 250#/CY reinforcing	40	LF	$110.00	$4,400
Slab on Grade, 6"				
Structural	120	SF	$15.00	$1,800
Plumbing	152	SF	$15.00	$2,280
Allow for epoxy dowels	224	EA	$75.00	$16,800
Hold downs, epoxy into existing foundation	20	EA	$125.00	$2,500
Subtotal For Foundations:				**$27,780**

SUPERSTRUCTURE	Quantity	Unit	Rate	Total ($)
Vertical Structure				
Wood Stud Framing and Sheathing				
2 x 4 at 16" 0.c., with 1/2" sheathing	560	SF	$9.15	$5,124
Plywood at existing framing	560	SF	$4.50	$2,520
Allow for new partitions	100	LF	$72.25	$7,225
Flat Roofs				
Re-nail	3,232	EA	$0.60	$1,939
Collectors from walls to roof	6	EA	$1,250.00	$7,500
Miscellaneous				
Hardware	2,287	SF	$2.50	$5,716
Pick up framing	2,287	SF	$1.00	$2,287
Subtotal For Superstructure:				**$32,311**

ENCLOSURE	Quantity	Unit	Rate	Total ($)
Exterior Walls				
Wall Framing, Furring and Insulation				
Insulation	1,279	SF	$1.15	$1,471
Gypsum wallboard at interior face of exterior wall	1,279	SF	$3.75	$4,796
Applied Exterior Finishes				
Minor repair and paint existing walls	1,279	SF	$1.15	$1,471

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Soffits				
New facia board, painted	171	LF	$24.00	$4,102
Paint soffits	945	SF	$3.00	$2,836
Exterior Windows and Louvers				NIC
Replace windows with dual glaze, low e	400	SF	$75.00	$30,010
Exterior Doors, Frames and Hardware				
Paint	4	EA	$90.00	$360
Subtotal For Enclosure:				**$45,046**

ROOFING	Quantity	Unit	Rate	Total ($)
Insulation				
Batt insulation, R-30 on underside	2,036	SF	$1.50	$3,054
Roofing	2,891	SF	($11.50	
Dens Deck roof board, 5/8"	2,891	SF	$2.50	$7,229
Vapor barrier	2,891	SF	$1.00	$2,891
Single ply roofing	2,891	SF	$8.00	$23,131
Gutters and downspouts	216	LF	$22.50	$4,860
Subtotal For Roofing:				**$41,165**

INTERIOR CONSTRUCTION	Quantity	Unit	Rate	Total ($)
Interior Partitions				
Insulation	2,992	SF	$0.85	$2,543
Gypsum wallboard, painted	5,984	SF	$4.75	$28,424
Interior Doors, Frames and Hardware				
Wood, Single leaf	10	EA	$1,685.00	$17,625
Wood, Double leaf	2	PR	$2,500.00	$5,000
Subtotal For Interior Construction:				**$53,592**

INTERIOR FINISHES	Quantity	Unit	Rate	Total ($)
Walls				
Ceramic tile	738	SF	$20.00	$14,750
Floors				
Sheet linoleum	332	SF	$12.00	$3,978
Ceramic tile	397	SF	$22.50	$8,939
Carpet	1,558	SF	$6.50	$10,125

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Bases				
Rubber	1,072	LF	$3.50	$3,752
Wood, painted	100	LF	$15.00	$1,500
Ceramic	123	LF	$23.00	$2,827
Ceilings				
Acoustic batt insulation	2,287	SF	$1.10	$2,515
Gypsum wallboard, painted	2,287	SF	$7.35	$16,806
Subtotal For Interior Finishes:				**$65,193**

PLUMBING	Quantity	Unit	Rate	Total ($)
Sanitary Fixtures & Connection Piping				
Sanitary fixtures	11	EA	$3,500.00	$38,500
Icemaker supply box				NIC
Dishwasher connections				NIC
Clothes washer supply/drain box	2	EA	$250.00	$500
Hose bibb - interior	2	EA	$200.00	$400
Hose bibb - exterior	2	EA	$450.00	$900
Plumbing Equipment				
Water heater, propane, 100 gal.	1	EA	$4,500.00	$4,500
Water meter, to 2"	1	EA	$1,600.00	$1,600
Sanitary Waste & Vent Systems				
Floor drain with piping	5	EA	$1,500.00	$7,500
Waste & vent rough-in for fixture	11	EA	$1,000.00	$11,000
Domestic Water Systems				
Backflow preventer, RP type, 2"	1	EA	$1,500.00	$1,500
Trap primer & TP lines (at FDs)	5	EA	$500.00	$2,500
Natural Gas Systems				
Gas to water heater	1	EA	$1,800.00	$1,800
Gas to range/oven	1	EA	$1,250.00	$1,250
Gas to clothes dryers	3	EA	$900.00	$2,700
Trade Specialties				
Sleeves, firestopping, pipe ID	1	LS	$750.00	$750
Testing, cleaning & disinfection	1	LS	$750.00	$750
Miscellaneous	1	LS	$1,000.00	$1,000
Subtotal For Plumbing:				**$77,150**

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HEATING, VENTILATION, & AIR-CONDITIONING	Quantity	Unit	Rate	Total ($)
VRF Multi-Split Systems				
Ducted	2,287	SF	$22.00	$50,303
Air Distribution and Return				
Kitchen hood exhaust duct	1	EA	$500.00	$500
Dryer vents	2	EA	$250.00	$500
Controls and Instrumentation				
VRV controls - DDC	1	LS	$7,500.00	$7,500
Exhaust fan control w/ lights	4	EA	$200.00	$800
Testing and Balancing				
Systems testing & balancing	10	HR	$130.00	$1,300
Trade Demolition & Specialties				
Firestopping, sleeves, etc.	1	LS	$750.00	$750
Miscellaneous	1	LS	$1,500.00	$1,500
Subtotal For Heating, Ventilation, & Air-Conditioning:				**$63,153**

FIRE PROTECTION	Quantity	Unit	Rate	Total ($)
Automatic wet sprinkler systems				
Wet sprinklers - complete, includes exterior soffit	2,287	SF	$6.50	$14,862
Subtotal For Fire Protection:				**$14,862**

ELECTRICAL	Quantity	Unit	Rate	Total ($)
Electrical service and distribution				
Equipment wiring	2,287	SF	$2.00	$4,573
Lighting	2,287	SF	$8.00	$18,292
Lighting controls	2,287	SF	$1.00	$2,287
Branch devices and circuitry	2,287	SF	$3.50	$8,003
Fire Alarm system	2,287	SF	$2.50	$5,716

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Telecommunications	2,287	SF	$3.00	$6,860
Security				NIC
Other electrical systems				
Demolition work	1	LS	$1,500.00	$1,500
Seismic restraints	1	LS	$800.00	$800
Temporary power & lighting	1	LS	$750.00	$750
			Subtotal For Electrical:	**$48,780**

EQUIPMENT	Quantity	Unit	Rate	Total ($)
Protective Guards, Barriers				
Allow for corner guards, etc.	1	LS	$1,500.00	$1,500
Prefabricated Compartments and Accessories				
Toilet Partitions and Accessories				
Grab bars	2	EA	$115.00	$230
Grab bar, shower 90 degree	1	EA	$310.00	$310
Toilet paper dispenser	2	EA	$85.00	$170
Seat cover dispenser	2	EA	$165.00	$330
Soap dispenser	4	EA	$110.00	$440
Mirror	3	EA	$337.00	$1,011
Paper towel dispenser and disposal	3	EA	$850.00	$2,550
Shower door	2	EA	$350.00	$700
Miscellaneous items	1	LS	$750.00	$750
Shelving and Millwork				
Storage shelving	20	LF	$17.50	$350
Janitor shelf and mop rack	1	EA	$1,500.00	$1,500
Cabinets and Countertops				
Kitchen				
Base cabinets with countertops				NIC
Dorm rooms				
Wardrobe cabinets	20	EA	$850.00	$17,000

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Toilet Countertops				
Metal support, solid surface countertops in toilets	9	LF	$500.00	$4,500
Light Control and Vision Equipment				
Window blinds	400	SF	$15.00	$6,002
White board				NIC
Signage	2,287	SF	$1.00	$2,287
Flat screen television, 42" with support				NIC
Special Use Equipment				
Refrigerator				NIC
Dishwasher				NIC
Stove w/ exhaust hood, Ansel system				NIC
Washer				NIC
Dryer				NIC
Amenities and Convenience Items				
Walk off mats, including recess				NIC
Fire extinguishers	2	EA	$350.00	$700
Subtotal For Equipment:				**$40,330**

SELECTIVE BUILDING DEMOLITION	Quantity	Unit	Rate	Total ($)
Building Demolition				
Interior finishes including floor finishes, gypsum wallboard, ceilings, tile, etc.	2,287	SF	$4.50	$10,289
Concrete pedestrian paving	610	SF	$1.50	$915
Slab on grade	120	SF	$12.50	$1,500
Roofing	2,891	SF	$0.85	$2,458
Wood framed structure	40	LF	$7.50	$300
Sanitary fixtures, plumbing	2,287	SF	$3.00	$6,860
Electrical	2,287	SF	$2.50	$5,716
Cut back T&G roof deck	171	SF	$15.00	$2,564
Windows	400	SF	$8.00	$3,201
Miscellaneous	2,287	SF	$1.50	$3,430
Hazardous Materials Abatement				NIC
Subtotal For Selective Building Demolition:				**$37,232**

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Concept Cost Plan

Apparatus Bay

San Rafael No. 55- Option 1

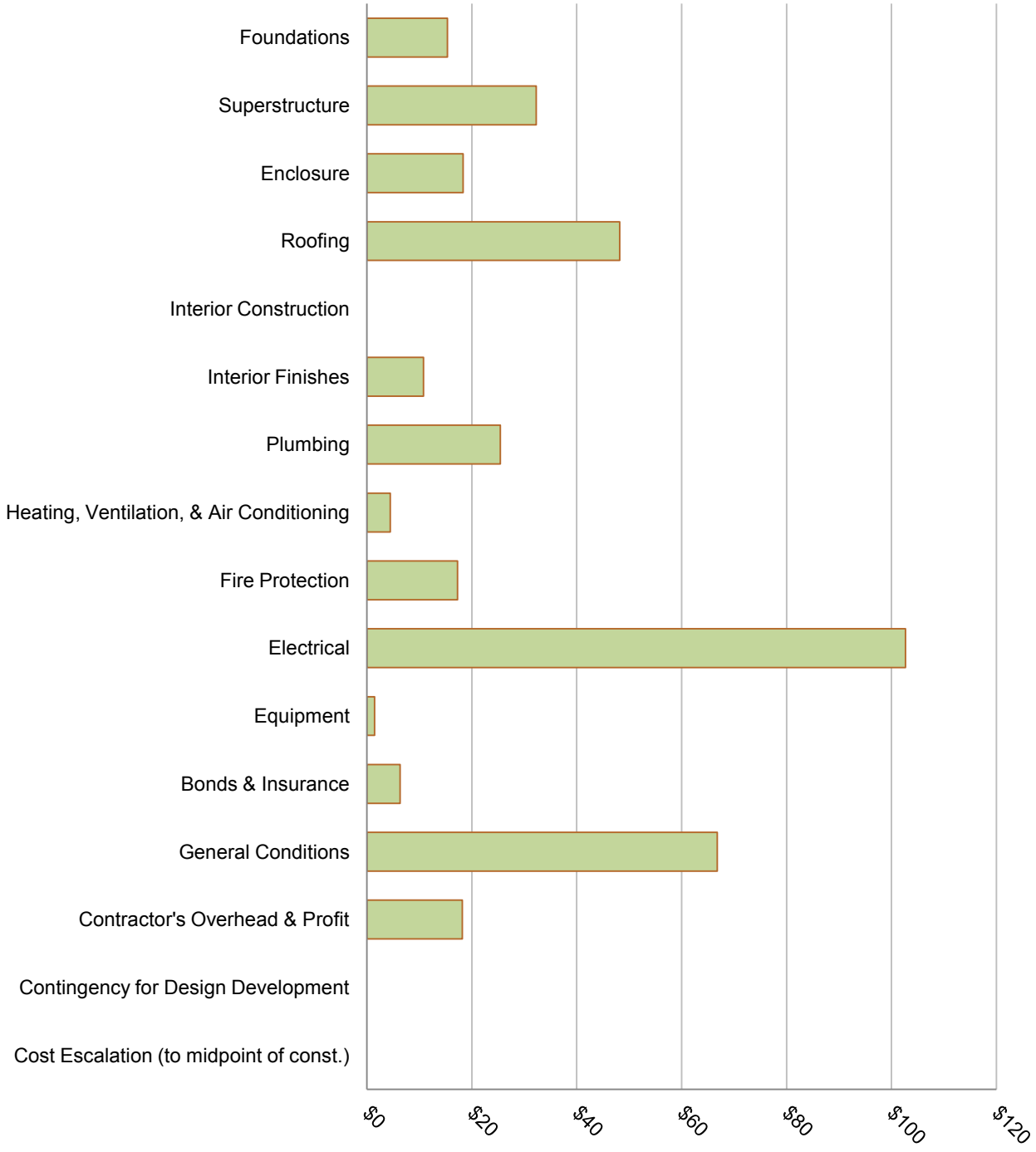
Control Quantities
Apparatus Bay Summary
Detailed Cost Breakdown

June 22, 2015

CSI UniFormat Summary	*2,061 SF*	*%*	*$/SF*	*$,000*
Foundations		4%	$7.46	$15
Superstructure		8%	$15.67	$32
Enclosure		5%	$8.89	$18
Roofing		13%	$23.38	$48
Interior Construction		0%	$0.00	$0
Interior Finishes		3%	$5.24	$11
Plumbing		7%	$12.34	$25
Heating, Ventilation, & Air Conditioning		1%	$2.17	$4
Fire Protection		5%	$8.39	$17
Electrical		27%	$49.83	$103
Equipment		0%	$0.70	$1
Selective Building Demolition		4%	$6.92	$14
Subtotal - Building Construction		*76%*	*$140.99*	*$291*
Site Preparation		0%	$0.00	$0
Site Improvement		0%	$0.00	$0
Site Mechanical Utilities		0%	$0.00	$0
Site Electrical Utilities		0%	$0.00	$0
Subtotal - Sitework		*0%*	*$0.00*	*$0*
Total - Building and Sitework Construction		*76%*	*$140.99*	*$291*
Bonds & Insurance	2.2%	2%	$3.07	$6
General Conditions		17%	$32.41	$67
Contractor's Overhead & Profit	5.0%	5%	$8.82	$18
Subtotal		*100%*	*$185.29*	*$382*
Contingency for Design Development	0.0%	0%	$0.00	$0
Cost Escalation (to midpoint of const.)	0.0%	0%	$0.00	$0
TOTAL CONSTRUCTION BUDGET		***100%***	***$185.29***	***$382***

NOTE: Inclusions and Exclusions listed in the Commentary Section.

CSI UniFormat Summary



FOUNDATIONS	Quantity	Unit	Rate	Total ($)
Spread Footings, including excavation				
Allow for new footing	32	LF	$175.00	$5,600
Slab on Grade, 6"	308	SF	$15.00	$4,620
Miscellaneous				
Allow for miscellaneous items	2,061	SF	$2.50	$5,152
			Subtotal For Foundations:	**$15,372**

SUPERSTRUCTURE	Quantity	Unit	Rate	Total ($)
Vertical Structure				
Strong back columns at both ends	4	EA	$3,500.00	$14,000
Roofs				
Re-nail	2,500	SF	$0.60	$1,500
Replace water damaged roofing, 15% of roof area	375	SF	$15.00	$5,625
Collector ties	4	EA	$1,250.00	$5,000
Miscellaneous				
Hardware and misc connections	1,897	SF	$2.50	$4,743
Pick up framing	1,897	SF	$0.75	$1,423
			Subtotal For Superstructure:	**$32,291**

ENCLOSURE	Quantity	Unit	Rate	Total ($)
Exterior Walls				
Applied Exterior Finishes				
Paint existing concrete	2,314	SF	$1.75	$4,049
Miscellaneous	2,314	SF	$1.00	$2,314
Exterior Windows and Louvers				
Aluminum, low-E	50	SF	$75.00	$3,750
Soffits				
Paint soffits	693	SF	$3.00	$2,078
Replace facia board, 2 x	225	LF	$17.50	$3,939
Paint facia board, 2 x	225	LF	$5.50	$1,238
Exterior Doors, Frames and Hardware				
Refinish existing roll up doors	1	EA	$950.00	$950
			Subtotal For Enclosure:	**$18,318**

ROOFING	Quantity	Unit	Rate	Total ($)
Roofing	2,754	SF	($17.50	
Rigid insulation, R-30, 6"	2,754	SF	$6.00	$16,522
Dens Deck roof board, 5/8"	2,754	SF	$2.50	$6,884
Vapor barrier	2,754	SF	$1.00	$2,754
Single ply roofing	2,754	SF	$8.00	$22,029
			Subtotal For Roofing:	**$48,188**

INTERIOR CONSTRUCTION	Quantity	Unit	Rate	Total ($)
Interior Partitions				
No work anticipated				NIC
			Subtotal For Interior Construction:	

INTERIOR FINISHES	Quantity	Unit	Rate	Total ($)
Floors				
Concrete sealer	2,061	SF	$1.00	$2,061
Bases				
Paint	200	LF	$2.50	$499
Ceilings				
Paint exposed elements	2,061	SF	$4.00	$8,243
			Subtotal For Interior Finishes:	**$10,803**

PLUMBING	Quantity	Unit	Rate	Total ($)
Sanitary Fixtures & Connection Piping	2,061	SF	$3.50	$7,213
Domestic Water Systems	2,061	SF	$1.00	$2,061
Natural Gas Systems				
Gas to space heater	1	EA	$1,200.00	$1,200
Compressed Air Systems				
Air compressor, dryer, filters	1	LS	$3,500.00	$3,500
Compressed air piping, to 3/4"	75	LF	$35.00	$2,625
Quick disconnect with drop	1	EA	$350.00	$350
CA hose reel - retractable	2	EA	$750.00	$1,500
Rainwater Drainage System				
Roof & overflow drainage system	2,061	SF	$2.00	$4,122
Trade Specialties				
Sleeves, firestopping, pipe ID	1	LS	$750.00	$750
Testing, cleaning & disinfection	1	LS	$600.00	$600
Miscellaneous	1	LS	$1,500.00	$1,500
Subtotal For Plumbing:				**$25,420**

HEATING, VENTILATION, & AIR-CONDITIONING	Quantity	Unit	Rate	Total ($)
VRF Multi-Split Systems, ducted and unducted				NIC
Air Handling Equipment				
Vehicle exhaust system -reused				NIC
Unit heater, suspended type	1	EA	$2,200.00	$2,200
Testing and Balancing				
Systems balancing	4	HR	$130.00	$520
Trade Demolition & Specialties				
Firestopping, sleeves, etc.	1	LS	$250.00	$250
Miscellaneous	1	LS	$1,500.00	$1,500
Subtotal For Heating, Ventilation, & Air-Conditioning:				**$4,470**

FIRE PROTECTION	Quantity	Unit	Rate	Total ($)
Automatic wet sprinkler systems				
Wet sprinklers - complete, includes exterior soffit	2,660	SF	$6.50	$17,289
Subtotal For Fire Protection:				**$17,289**

ELECTRICAL	Quantity	Unit	Rate	Total ($)
Electrical service and distribution (service is for the entire station)				
Service and Distribution				
400A distribution panelboard	1	EA	$12,000.00	$12,000
Associated panelboards and feeders	5,500	SF	$3.00	$16,500
Emergency power transfer switch	5,500	SF	$0.75	$4,125
Connection to 100KW generator (See Site Development)	1	LS	$5,000.00	$5,000
Associated panelboards and feeders	5,400	SF	$1.50	$8,100
Equipment wiring	2,061	SF	$2.00	$4,122
Lighting	2,061	SF	$8.00	$16,486
Lighting controls	2,061	SF	$1.00	$2,061
Branch devices and circuitry	2,061	SF	$3.50	$7,213
Fire Alarm system	2,061	SF	$2.50	$5,152
Telecommunications	2,061	SF	$3.00	$6,182
Security				NIC
Dispatch/Antenna:				
Rough-in only	1	LS	$7,500.00	$7,500
Other electrical systems				
Demolition work	1	LS	$2,500.00	$2,500
Seismic restraints	1	LS	$5,000.00	$5,000
Temporary power & lighting	1	LS	$750.00	$750
Subtotal For Electrical:				**$102,691**

EQUIPMENT	Quantity	Unit	Rate	Total ($)
Shelving and Millwork				
Allow for storage shelving	50	LF	$15.00	$750
Cabinets and Countertops				
Work bench				NIC
Lockable cabinets				NIC
Wardrobe cabinets				NIC
Light Control and Vision Equipment				
Window blinds				NIC
Amenities and Convenience Items				
Walk off mats, including recess				NIC
Fire extinguishers	2	EA	$350.00	$700
			Subtotal For Equipment:	**$1,450**

SELECTIVE BUILDING DEMOLITION	Quantity	Unit	Rate	Total ($)
Building Demolition				
Slab on Grade, 6"	308	SF	$6.00	$1,848
Cut back overhang	225	SF	$5.00	$1,125
Windows	50	SF	$5.50	$275
Roofing, sheetmetal	2,754	SF	$1.00	$2,754
Remove water damaged roofing, 15% of roof area	413	SF	$7.50	$3,098
Miscellaneous	2,061	SF	$2.50	$5,152
Hazardous materials abatement				NIC
			Subtotal For Selective Building Demolition:	**$14,251**

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Concept Cost Plan

Sitework

San Rafael No. 55- Option 1

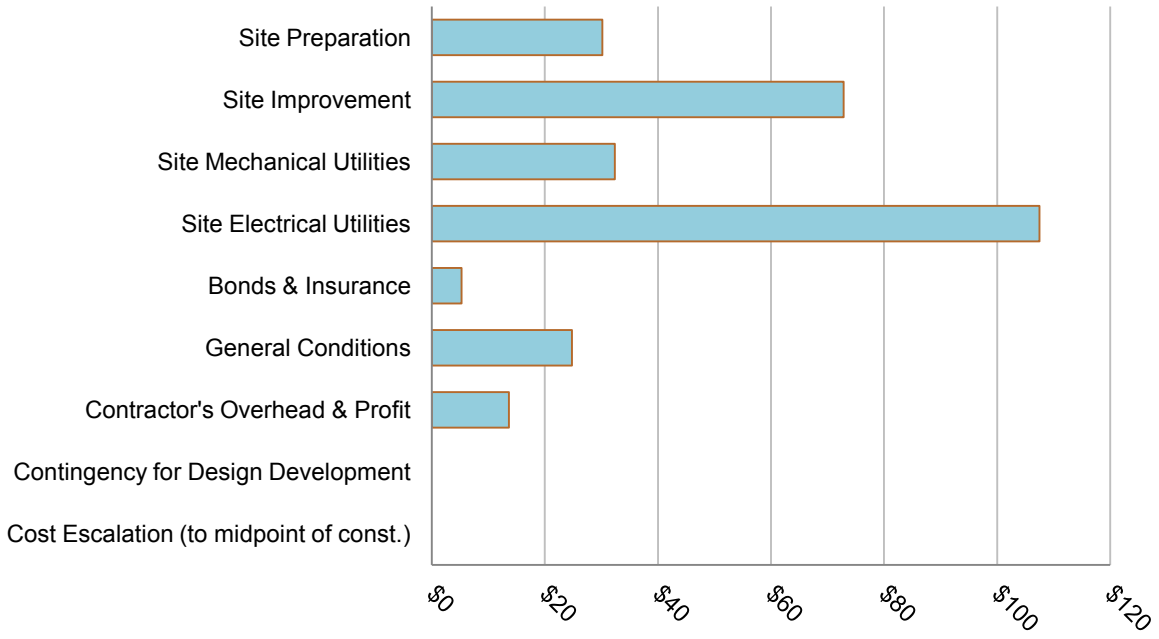
Control Quantities
Sitework Summary
Detailed Cost Breakdown

June 22, 2015

CSI UniFormat Summary	*7,794 SF*	*%*	*$/SF*	*$,000*
Site Preparation		11%	$3.87	$30
Site Improvement		25%	$9.35	$73
Site Mechanical Utilities		11%	$4.16	$32
Site Electrical Utilities		37%	$13.79	$108
Subtotal - Sitework		*85%*	*$31.17*	*$243*
Total - Building and Sitework Construction		*85%*	*$31.17*	*$243*
Bonds & Insurance	2.2%	2%	$0.68	$5
General Conditions		9%	$3.18	$25
Contractor's Overhead & Profit	5.0%	5%	$1.75	$14
Subtotal		*100%*	*$36.78*	*$287*
Contingency for Design Development		0%	$0.00	$0
Cost Escalation (to midpoint of const.)		0%	$0.00	$0
TOTAL CONSTRUCTION BUDGET		***100%***	***$36.78***	***$287***

NOTE: Inclusions and Exclusions listed in the Commentary Section.

CSI UniFormat Summary



SITE PREPARATION	Quantity	Unit	Rate	Total ($)
Site Clearing and Demolition				
Concrete paving	2,047	SF	$1.85	$3,786
Asphalt paving				NIC
Clear and grubb vegetation	2,797	SF	$0.50	$1,399
Allowance for SWPPP	1	LS	$15,000.00	$15,000
Allowance for miscellaneous	1	LS	$10,000.00	$10,000
Hazardous materials abatement				
Assume none required				NIC
			Subtotal For Site Preparation:	**$30,185**

SITE IMPROVEMENT	Quantity	Unit	Rate	Total ($)
Vehicular and Pedestrian Paving				
Concrete paving	2,047	SF	$10.00	$20,465
Allow for curbs	1	LS	$5,000.00	$5,000
Drainage				
Allow for new area drains, sand/oil separator, connection to main	2,047	SF	$2.25	$4,605
Lighting				
Allow for new site lights in addition to existing	3	EA	$3,500.00	$10,500
Landscaping and Miscellaneous Items				
Clearing, topsoil amendment	2,797	SF	$1.00	$2,797
Landscaping	2,797	SF	$1.50	$4,196
Drainage	2,797	SF	$2.00	$5,594
Lighting, low level	2,797	SF	$0.65	$1,818
Fencing and Miscellaneous Accessories				
Chain link fencing and decorative fencing	275	LF	$65.00	$17,875
			Subtotal For Site Improvement:	**$72,849**

SITE MECHANICAL UTILITIES	Quantity	Unit	Rate	Total ($)
Site Mechanical				
Sanitary sewer	60	LF	$135.00	$8,100
Storm drainage to main	60	LF	$135.00	$8,100
Potable water to main	60	LF	$135.00	$8,100
Fire water to main	60	LF	$135.00	$8,100
Subtotal For Site Mechanical Utilities:				**$32,400**

SITE ELECTRICAL UTILITIES	Quantity	Unit	Rate	Total ($)
Site Electrical				
Electric conduit to point of connection	1	LS	$7,500.00	$7,500
Allow for 100KW emergency generator, with ATS's, panelboards and feeders	1	LS	$100,000.00	$100,000
Subtotal For Site Electrical Utilities:				**$107,500**

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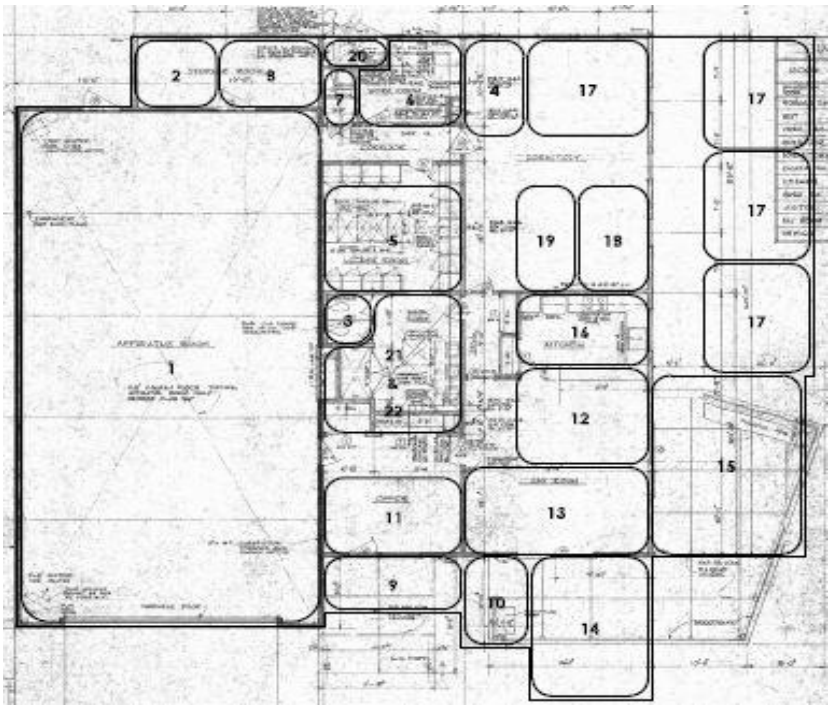


Concept Cost Plan

Addition

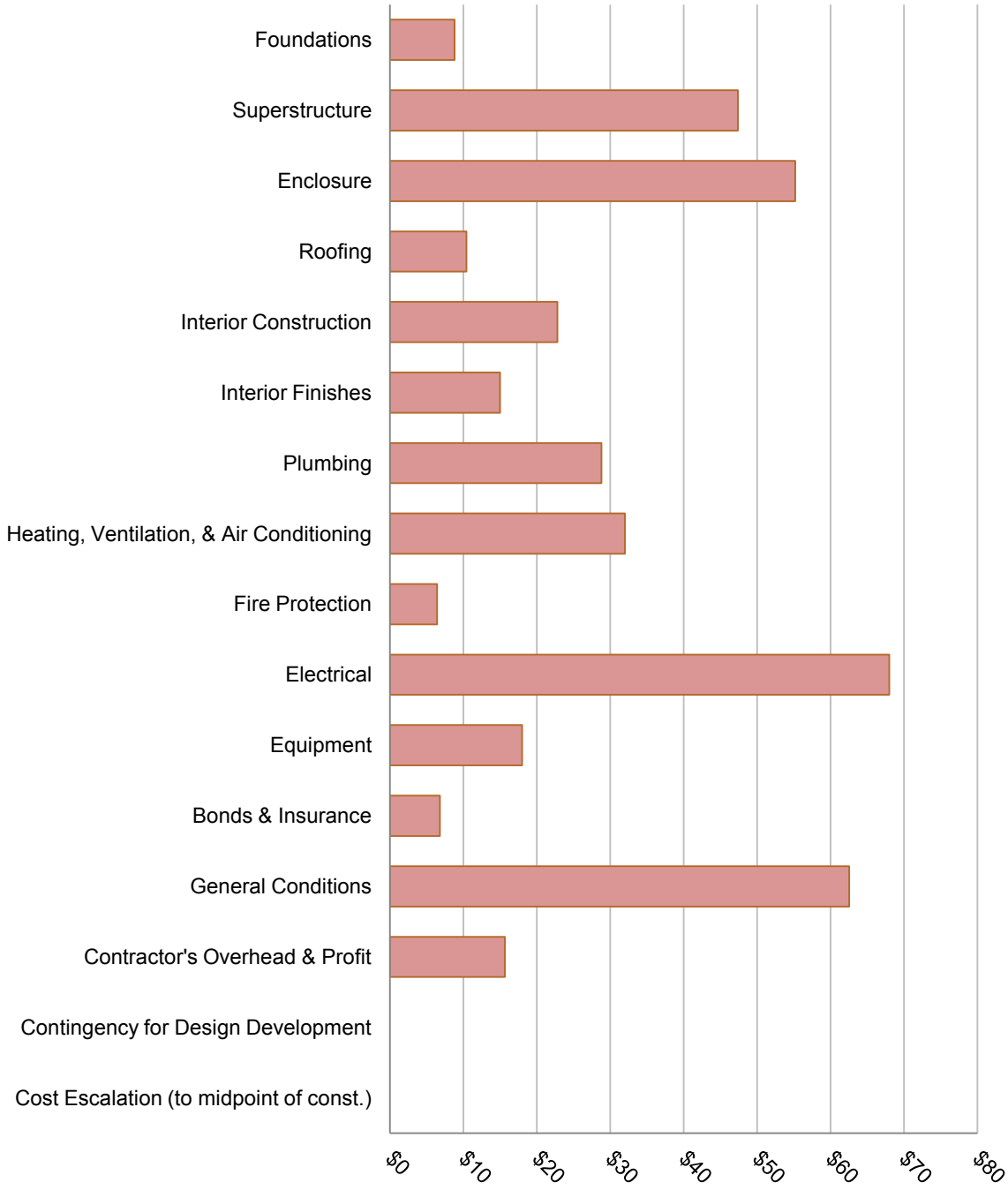
San Rafael No. 55- Option 1

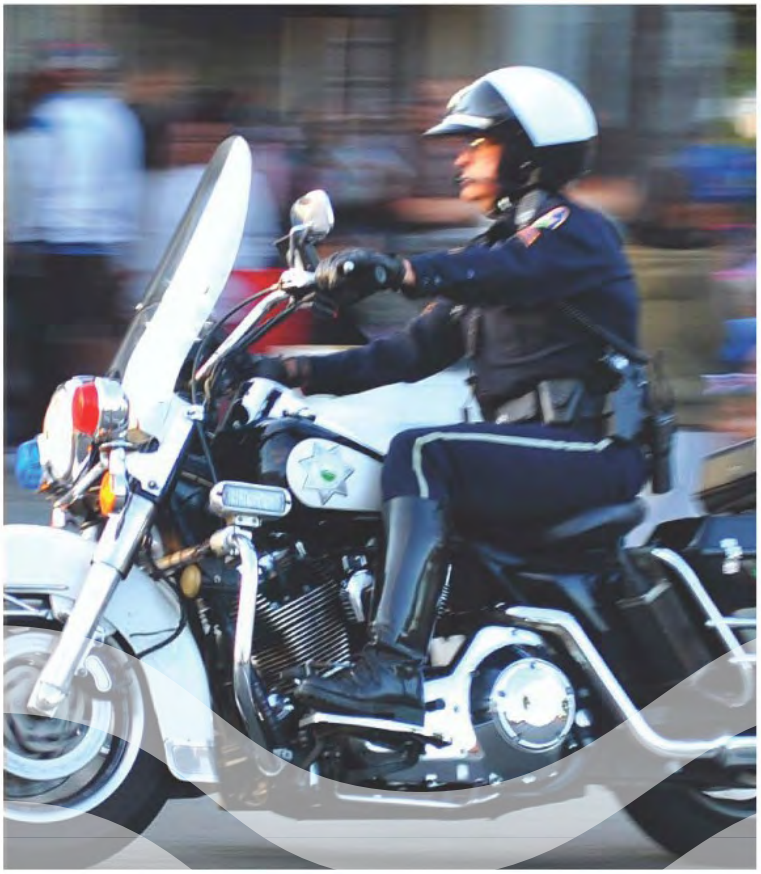
June 22, 2015

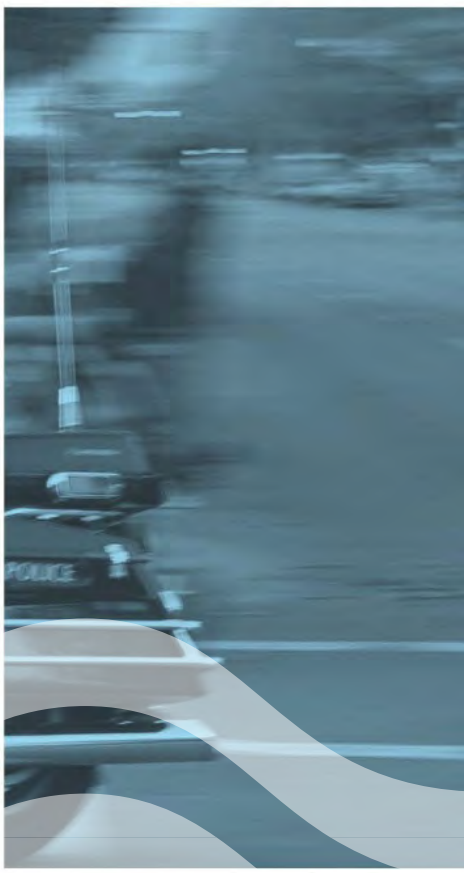
CSI UniFormat Summary	*800 SF*	*%*	*$/SF*	*$,000*
Foundations		2%	$11.00	$9
Superstructure		12%	$59.25	$47
Enclosure		14%	$69.00	$55
Roofing		3%	$13.00	$10
Interior Construction		6%	$28.50	$23
Interior Finishes		4%	$18.75	$15
Plumbing		7%	$36.00	$29
Heating, Ventilation, & Air Conditioning		8%	$40.00	$32
Fire Protection		2%	$8.00	$6
Electrical		17%	$85.00	$68
Equipment		5%	$22.50	$18
Subtotal - Building Construction		*79%*	*$391.00*	*$313*
Total - Building and Sitework Construction		*79%*	*$391.00*	*$313*
Bonds & Insurance	2.2%	2%	$3.50	$7
General Conditions		16%	$18.60	$63
Contractor's Overhead & Profit	5.0%	4%	$3.50	$16
Subtotal		*100%*	*$497.25*	*$398*
Contingency for Design Development	0.0%	0%	$0.00	$0
Cost Escalation (to midpoint of const.)	0.0%	0%	$0.00	$0
TOTAL CONSTRUCTION BUDGET		***100%***	***$497.25***	***$398***

NOTE: Inclusions and Exclusions listed in the Commentary Section.

CSI UniFormat Summary







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