

PIER INFRASTRUCTURE ASSESSMENT STUDY
Phase 2 - UPGRADE STUDIES
NOVEMBER 17, 2008



MOFFATT & NICHOL



City of
Santa Monica



Santa Monica Pier Infrastructure Assessment Study

Phase 2 – Upgrade Studies

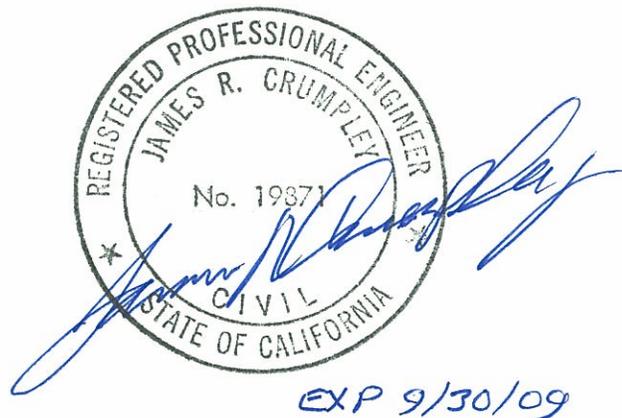
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**Santa Monica Pier Infrastructure Assessment
Phase 2 - Upgrade Studies**

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Santa Monica Pier Infrastructure Assessment – Phase 2 Upgrade Studies

EXECUTIVE SUMMARY

This report contains the findings and recommendations of potential upgrades to the Santa Monica Pier. The Santa Monica Pier is composed of two separate pier structures, the Municipal Pier which extends from the access bridge to the outer end and serves as the primary access way and the Newcomb Pier which serves as the platform for most of the commercial buildings, the on deck parking lot, and the Pacific Park amusement area. The current conditions are based on the finding of the visual inspection of the pier and appurtenant systems. Those findings are published in the Phase 1 report titled Existing Conditions. Upgrades in most cases are beyond repairs recommended in the Phase 1 report. However, if upgrades are made in an area, then the repairs would automatically be taken care of for that area.

Newcomb Pier Upgrades:

Recommended upgrades to the Newcomb Pier include upgrading the structure in the parking and walkway areas to support a fifteen ton truck, replacement of all steel utility hangers and supports with corrosion resistant materials, and additional fire protection facilities.

The highest priority for structural upgrade is the parking area from Bent Bents 3 and 12. This is identified in the report as Area 2. The next priority for structural upgrade is the remainder of the parking area followed by the adjacent to the Municipal Pier, then the areas between buildings and finally the pathway along the South and West edges of the pier by Pacific Park. While an upgrade to the aquarium roof was studied, it is not recommended at this time.

For non-structural upgrades, the highest priority is the replacement of the utility hangers followed by the additional fire protection facilities.

Municipal Pier Upgrades:

Recommended upgrades for the Municipal Pier include the Phase 4 reconstruction from Bent 40 to Bent 58 using a concrete sub-structure and timber superstructure designed to accommodate a 20 ton truck, reinforcement of the concrete waffle slab beyond Bent 58 to the end platform to accommodate the 20 ton truck, and construction of an emergency evacuation stair and ramp system, replacement of Necklace Light system, along with the replacement of all steel utility hangers and supports with corrosion resistant materials. The Necklace Lights actually surround both the Municipal Pier and the Newcomb Pier.

The highest priority structurally is the Phase 4 upgrade. However, for fire safety, the emergency evacuation system is also a very high priority.

Urban Design Upgrades:

An urban design study was prepared by WRT as part of the Santa Monica Pier Infrastructure Assessment Study as a companion to this report. That study makes recommendations regarding urban furnishings as well unifying urban design themes. The estimated costs of the urban furnishings are included in the summary below.

Summary of estimated cost for recommended upgrades.

Newcomb Pier Structural Upgrades (Areas 2 and 3)	\$ 1,506,000.
Newcomb Pier Structural Upgrades (Remainder)	\$ 5,319,800.
Newcomb Pier Utility Upgrades	\$ 338,000.
Newcomb Pier Fire Protection Upgrades	\$ 210,000.
Municipal Pier Phase 4	\$ 4,771,000.
Municipal Pier Waffle Slab Reinforcement	\$ 3,779,000.
Municipal Pier Evacuation Ramp	\$ 500,000.
Necklace Lights	\$ 442,000.
Pier Lighting	\$ 1,850,000.
Carousel Building Onion Dome	\$ 50,000.
Urban Furnishing	\$ 1,358,000.
Total Construction	\$ 20,123,800.
Engineering	\$ 1,636,000.
Total Upgrade Project Cost	<u>\$ 21,759,800.</u>

Santa Monica Pier Infrastructure Assessment – Phase 2 Upgrade Studies

NEWCOMB PIER STRUCTURAL UPGRADE

The Newcomb Pier was originally constructed by private amusement park developers. While the pile spacing is generally consistent, the stringer size and spacing is not. Whether this inconsistency is the result of building for different uses at the time, or the result of upgrades and reconstruction in different locations and different times is not clear. Currently the stringers vary from 3"x10" to 6"x16" with a few larger beams in various locations. In this discussion the occasional large beams will be ignored, and only the general pattern observed in the various locations will be considered.

In general the stringers for the Newcomb Pier are not adequate for truck wheel loads. In addition, the decking the Easterly of Bent 12 is only 1 ½" thick and is not adequate independent of the stringers supporting it.

Moffatt & Nichol has recommended that the entire area currently being used for parking be upgraded to support H-15 truck loading. It is also recommended that the walkway North of the buildings adjacent to the Municipal Pier as well as the walkways West and South of Pacific Park be upgraded to a similar standard for maintenance and repair access. In the zone between the North walkway and the parking area Moffatt & Nichol recommends that the stringers be upgraded to support a live load of at least 200 pounds per square foot (psf) or the actual superimposed loads from any proposed new building, whichever is greater.

Specific recommendations based on areas: See Figure 1 - 3 for area locations.

Area 1: Pedestrian area bounded by Piles 1_h, 1_o, 3_h, and 3_o.

In this zone the stringers are 3"x10" at 18" on center (o.c.). The calculated capacity for this area is 51.5 psf and a maximum vehicle weight of 4,200 pounds. This is less capacity than the adjacent aquarium roof, and less than the code capacity for pedestrian assembly areas of 100 psf. It is recommended that this area be upgraded by adding additional 3"x10" at 18" o.c. These could be centered between the existing stringers or placed next to them. Either configuration would double the capacity. The estimated cost for this upgrade is approximately \$ 133,000.

Area 2: Parking area bounded by Bents 3 and 4 on the East, Bent 12 on the West, existing buildings on the North and the edge of the pier on the South.

In this zone the stringers are 3"x12" at 22" o.c. with 2" nominal decking. The calculated capacity for this area is 64.5 psf and a maximum vehicle weight of 5,500 pounds. To meet the recommended H-15 truck capacity, the stringers in this area must be removed and replaced with 16" deep stringers. In most cases the pile caps have an additional 4" thick member on the top which could be removed to maintain the same top of stringer elevation. In cases where this 4" member does not exist, then the pile caps would need to be lowered. To accommodate the transverse aisle at the East end of the parking lot, the stringers between Bent 4 and 6 are recommended to be 6"x16" at 16" o.c. with at least 3" nominal decking. For the longitudinal aisles and parking spaces from Bent 6 to Bent 12 the stringers are

recommended to be 4"x16" at 16" o.c. with at least 3" nominal decking. The estimated cost for this upgrade is approximately \$1,506,000.

Area 3: The walkway North of the buildings between Bent 3 and Bent 16.

In this zone the stringers are 3"x16" at 22" o.c. The calculated capacity for this area is 126 psf or a seven ton vehicle. The code requirement for a sidewalk is 250 psf to allow for occasional vehicles. It is recommended that this area be upgraded sidewalk standards with 3"x16" or 4"x16" stringers at placed between the existing stringers and 3" decking to allow access for maintenance vehicles and possibly delivery vehicles. The estimated cost for this upgrade is approximately \$ 330,800.

Area 4: Parking area bounded by Bent 12 on the East, Bent 16 on the West, existing building on the North and the edge of the pier on the South.

In this zone the stringers are 3"x16" at 22" o.c. with 3" nominal decking. The calculated capacity for this area is 126 psf or a seven ton vehicle. In order to achieve the recommended capacity to support an H-15 truck, these stringers need to be supplemented. It is recommended that 4"x16" stringers be added between the existing stringers. The estimated cost for this upgrade is approximately \$ 720,000.

Area 5: Pedestrian area bounded by Bent 15 on the East, Bent 16 on the West, Area 3 on the North and Area 4 on the south.

This zone has 3"x16" stringers at 18" o.c. The calculated capacity of this area is 155 psf or a 12, 700 pound vehicle running in the transverse direction. Since this is currently a pedestrian area within the building zone it is not necessary to upgrade this area at this time. However, if stringers must be replaced due to damage or deterioration, they should be replaced with 4"x16" stringers. If the use of the area is ever changed to a vehicular driveway then the stringers should be replaced with 6"x16" stringers at 16" o.c.

Area 6: The parking entrance and the central transverse aisle (Events Lane) between Bents 16 and 19 from the Municipal Pier to the Southern edge of the pier; except an area between Bents 18 and 19 from pile Row a to Pile Row f.

This area has already been upgraded with 6"x16" stringers at 16" o. c. and has the capacity to support H-15 truck loading on a regular basis and H-20 (twenty ton) trucks on an occasional basis.

Area 7: Portion of Entrance lane and a parking area bounded by Piles 18a, 18f, 21a, and 21f.

This area has 4"x16" stringers at 22" o.c., and has a calculated capacity to support a maximum vehicle weight of 14,660 pounds. The portion of the area between Bents 18 and 19 needs to be upgraded to 6"x16" stringers at 16" o.c. to complete the Entrance Lane upgrade; or supplement the existing stringers with 6"x16" stringers. The remainder of the area between Bent 19 and Bent 21 should be upgraded to 4"x16" stringers at 16" o.c. or supplement with new 3"x16" or 4" x16" stringers between each existing stringer. The estimated cost for this upgrade is approximately \$ 174,000.

Area 8: A parking area bounded by Piles 19f, 19m, 21f and 21m. In this zone the stringers are 3"x16" at 22" o.c. with 3" nominal decking. The calculated capacity for this area is 126 psf or a seven ton vehicle. In order to achieve the recommended capacity to support an H-15 truck, these stringers need to be supplemented. It is recommended that 4"x16" stringers be added between the existing stringers. The estimated cost for this upgrade is approximately \$ 153,000.

Area 9: A longitudinal aisle and parking area bounded by Piles 19m, 19o, 23m and 23o.

This zone connects the Events Lane to the Maintenance Building entrance and has already been upgraded with 4"x16" stringers at 16" o. c. and has the capacity to support H-15 truck loading on a regular basis and H-20 (twenty ton) trucks on an occasional basis.

Area 10: A parking area bounded by Piles 19m, 35m and the southern edge of the pier, excluding Area 9.

This area has 4"x16" stringers at 22" on center; and has a calculated capacity to support a maximum vehicle weight of 14,660 pounds for transverse travel and 19,900 pounds for longitudinal travel. In order to achieve the recommended capacity to support an H-15 truck, these stringers need to be supplemented. It is recommended that 3"x16" or 4"x16" stringers be added between the existing stringers from Bent 19 to Bent 29 and Bent 31 to Bent 32; and 6"x16" stringers be added between Bent 29 and Bent 31. The area between Bent 32 and Bent 35 is within the fence of Pacific Park, but is still part of the timber structure. It is recommended that this area be upgraded in a manner similar to the area from Bent 19 to Bent 32 if the use changes, or vehicles are anticipated. The estimated cost for this upgrade is approximately \$ 2,052,000.

Area 11: A pedestrian area Bents 26 and 28, and between Area 10 and the walkway adjacent to the Municipal Pier. This is the site of the proposed new Central Restrooms.

This zone has recently installed 4"x12" stringers at 12" o.c. and has a calculated capacity of 174 psf or a maximum vehicle weight of 14,440 pounds traveling transverse. This meets the required capacity for pedestrian areas, but is slightly less than our recommended capacity for the building areas. Since the new Central Restrooms are in design now, Moffatt & Nichol recommend waiting for the building loads to determine if an upgrade is required.

Area 12: The walkway area between the building zone and the Municipal Pier from Bent 26 to Bent 51.

This walkway has 3"x12" and 4"x12" stringers at spacings from 12" to 24". Between Bent 26 and Bent 27 the 4"x12" stringer have been supplemented with 4"x16" stringers to provide maintenance vehicle and vender cart access to Area 11 and the current cart storage area. All of this walkway should be upgraded to 4"x16" stringers at 16" o.c. to allow for maintenance vehicles. The estimated cost for this upgrade is approximately \$ 828,000.

Area 13: A building area between Bents 36 and 40 and between Pile Rows c and n; newly occupied by the Trapeze School of New York.

This zone was upgraded to 4"x16" stringers at 18" o.c. during the 2006 construction period, and meets our recommendations for building areas. As such, no upgrades are recommended at this time.

Area 14: A pedestrian and vehicular passageway twenty-seven foot wide lane from Bent 51 to the Western edge of the Newcomb Pier, and from the Southern edge of the Municipal Pier to the Expansion joint at Pile Row n.

This zone has 3"x14" and 3"x16" stringers alternating at 12" o.c. and has a calculated capacity of 213 psf or a maximum vehicle weight of 15,375 pounds traveling transverse. This is a primary access route for maintenance vehicle and should be upgraded to 6"x16" stringers at 16" o.c. The estimated cost for this upgrade is approximately \$ 334,000.

This area has timber piles that are within the tidal zone and are subject to wave action. At the time that the decision was made to use concrete piles for the Municipal Pier sections within the tidal zone, it was also discussed to use concrete pile under the Newcomb Pier where they have the same condition. Area 14 is that type of area on the Newcomb Pier. Therefore, it is recommended that Area 14 be reconstructed using concrete piles and caps at the same time that the deck is upgraded. In order to maintain the westernmost building of Pacific Park, the zone of reconstruction would be limited to the western twenty-seven feet of the Newcomb Pier between pile rows a and n. The area affected would be 3429 SF, and the reconstruction cost, including a temporary trestle would be \$ 1,200,000.

Pacific Park area supported by concrete piles and pile caps. This area was reconstructed in 1987 with 4"x16" timber stringers at 18" o.c. supported on a concrete sub-structure, and meets the basic recommendation for building/pedestrian areas. The Western and Southern edges are vehicular as well as pedestrian passageways. See Areas 15 and 16 below.

Area 15: A pedestrian and vehicular passageway from Bent 52 to the Western edge of the Newcomb Pier, and from the Expansion joint at Pile Row n to the Southern edge of the pier.

The existing capacity of this area based on the transverse truck loading is 220 psf or a 9 Ton truck. In order to support the recommended 15 Ton truck load in the transverse direction the existing stringers should be supplemented with 6"x16" stringers between each existing. The estimated cost for this upgrade is approximately \$ 210,000.

Area 16: A pedestrian and vehicular passageway from Bent 35 to the Western edge of the Newcomb Pier, and from the Pacific Park fence to the Southern edge of the pier.

The existing capacity of this area based on the longitudinal truck loading is 220 psf or a 12.4 Ton truck. In order to support the recommended truck loading in the longitudinal direction the existing stringers should be supplemented with 3"x16" or 4"x16" stringers between each existing. The estimated cost for this upgrade is approximately \$ 385,000.

Area 17: The Pacific Park building area from Bent 40 to Bent 51 and from Pile Row a to n.

Just as with Area 14, it is the goal to have concrete piles in the tidal zone. However, since this is an active commercial area it is reasonable that this upgrade would not be implemented until either the buildings are scheduled for redevelopment, or there is a need for major pier structure reconstruction. Moffatt & Nichol have estimated the cost of this upgrade using the same substructure as the Municipal Pier Phase 4, and 4x16 stringers at 18" on center. The estimated cost for this upgrade is approximately \$ 5,000,000.

The proposed upgrade to the Newcomb Pier without Area 17 is estimated to have a total construction cost of \$7,766,000, including allowance for replacement of up to 25 stringers identified in the assessment report as needing replacement.

Santa Monica Pier Upgrades
Upgrade Estimates
Newcomb Pier Upgrade

JN 5332-02
September 5, 2008

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	EXTENSION	TOTALS
□ Area 1 - 2,160 SF						
1	Remove Deck	2160	SF	10.00	21,600	
2	Install 3x10 Stringers @16	96	EA	480.00	46,080	
3	Install Decking	2160	SF	18.00	38,880	\$106,560
□ Area 2 - 25,028 SF						
4	Remove Deck and Stringers	25028	SF	10.00	250,280	
5	Install 6x16 Stringers @16	188	EA	670.00	125,960	
6	Install 4x16 Stringers @16	652	EA	580.00	378,160	
7	Install Decking	25028	SF	18.00	450,504	\$1,204,904
□ Area 3 - 5,640 SF						
9	Remove Deck and Stringers	5640	SF	10.00	56,400	
9	Install 4x16 Stringers @22	184	EA	580.00	106,720	
10	Install Decking	5640	SF	18.00	101,520	\$264,640
□ Area 4 - 13,110 SF						
11	Remove Deck	13110	SF	10.00	131,100	
12	Install 4x16 Stringers @22	360	EA	580.00	208,800	
13	Install Decking	13110	SF	18.00	235,980	\$575,880
□ Area 7 - 3,150 SF						
14	Remove Deck	3150	SF	10.00	31,500	
15	Install 6x16 Stringers @22	28	EA	670.00	18,760	
16	Install 4x16 Stringers @22	56	EA	580.00	32,480	
17	Install Decking	3150	SF	18.00	56,700	\$139,440
□ Area 8 - 2,785 SF						
18	Remove Deck	2785	SF	10.00	27,850	
19	Install 4x16 Stringers @22	76	EA	580.00	44,080	
20	Install Decking	2785	SF	18.00	50,130	\$122,060
□ Area 10 - 36,824 SF						
21	Remove Deck	36824	SF	10.00	368,240	
22	Install 4x16 Stringers @22	858	EA	580.00	497,640	
22	Install 6x16 Stringers @22	168	EA	670.00	112,560	
23	Install Decking	36824	SF	18.00	662,832	\$1,641,272
□ Area 12 - 13,082 SF						
28	Remove Deck and Stringers	13082	SF	10.00	130,820	
29	Install 4x16 Stringers @16	510	EA	580.00	295,800	
30	Install Decking	13082	SF	18.00	235,476	\$662,096
□ Area 14 - 4,843 SF						
28	Remove Deck and Stringers	4843	SF	10.00	48,430	
29	Install 6x16 Stringers @16	196	EA	670.00	131,320	
30	Install Decking	4843	SF	18.00	87,174	\$266,924
□ Area 15 - 3,510 SF						
28	Remove Deck	3510	SF	10.00	35,100	
29	Install 6x16 Stringers @18	98	EA	715.00	70,070	
30	Install Decking	3510	SF	18.00	63,180	\$168,350
□ Area 16 - 6,038 SF						
28	Remove Deck	6038	SF	10.00	60,380	
29	Install 4x16 Stringers @18	240	EA	580.00	139,200	
32	Install Decking	6038	SF	18.00	108,684	\$308,264
SUB-TOTAL						\$5,460,390
CONTINGENCY 25%						1,365,097
□ □ TOTAL ESTIMATE						\$6,825,487

Santa Monica Pier Upgrades
 Upgrade Estimates
 Newcomb Pier Area 14 Upgrade

JN 5332-02
 September 5, 2008

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	EXTENSION	TOTALS
□ Concrete Substructure						
1	Furnish Piles	770.00	LF	50	38,500	
2	Drive Piles	14.00	EA	6000	84,000	
3	Concrete Caps	98.78	CY	1200	118,533	
4	Concrete Struts	49.00	CY	1200	58,800	
5					0	
6					0	
7					0	
8					0	\$299,833
□ Timber Super Structure						
9	6x16x28' Stringers @ 16" o.c.	98.00	EA	850	83,300	
10	3x16 Decking	3429.00	SF	18	61,722	
11					0	
12					0	
13					0	
14					0	
15					0	
16					0	\$145,022
□ Appurtenances						
17	Handrail	127.00	LF	300	38,100	
18	Perimeter Lights	4.00	EA	5000	20,000	
19	Utilities- Maintain or Reinstall	1.00	LS	50000	50,000	
20	Catwalk	127.00	LF	300	38,100	
21					0	
22					0	
23					0	
24					0	\$146,200
□ Mobilization & Demo						
25	Work Trestle	1.00	LS	250000	250,000	
26	Remove Exist Superstructure	3429.00	SF	15.00	51,435	
27	Remove Exist Substructure	1	LS	26,000.00	26,000	
28	Mob Demob	1	LS	40,000.00	40,000	
29					0	
30					0	
31					0	
32					0	\$367,435
	SUB-TOTAL					\$958,490
	CONTINGENCY	25%		958,490	239,622	
□ □ TOTAL ESTIMATE						\$1,198,112

Santa Monica Pier Upgrades
Upgrade Estimates
Newcomb Pier Area 17 Upgrade

JN 5332-02
September 5, 2008

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	EXTENSION TOTALS
□ Concrete Substructure					
1	Furnish Piles	4235.00	LF	50	211,750
2	Drive Piles	77.00	EA	6000	462,000
3	Concrete Caps	543.28	CY	1200	651,933
4	Concrete Struts	423.45	CY	1200	508,140
5					0
6					0
7					0
8					0
					\$1,833,823
□ Timber Super Structure					
9	4x16 Stringers @ 18" o.c.	98.00	EA	580	56,840
10	3x16 Decking	29632.91	SF	18	533,392
11					0
12					0
13					0
14					0
15					0
16					0
					\$590,232
□ Appurtenances					
17	Handrail	0.00	LF	300	0
18	Perimeter Lights	0.00	EA	5000	0
19	Utilities- Maintain or Reinstall	1.00	LS	200000	200,000
20	Catwalks	720.00	LF	300	216,000
21					0
22					0
23					0
24					0
					\$416,000
□ Mobilization & Demo					
25	Work Trestle	1.00	LS	500,000	500,000
26	Remove Exist Superstructure	29632.91	SF	15.00	444,493
27	Remove Exist Substructure	1	LS	210,000	210,000
28	Mob Demob	1	LS	50,000.00	50,000
29					0
30					0
31					0
32					0
					\$1,204,493
	SUB-TOTAL				\$4,044,548
	CONTINGENCY	25%		4,044,548	1,011,137
□ □ TOTAL ESTIMATE					\$5,055,685

Upgrade Studies - Structural



Area 1: 51.5 psf
2 Ton Vehicle

Area 2: 64.5 psf
2.75 Ton Vehicle

Area 3: 126 psf
7 Ton Vehicle

Area 4: 126 psf
7 Ton Vehicle

Area 5: 155 psf
6 Ton Vehicle

Area 6: 485 psf
15/20 Ton Truck

Aquarium Roof:
86 psf

Figure 1

Upgrade Studies - Structural

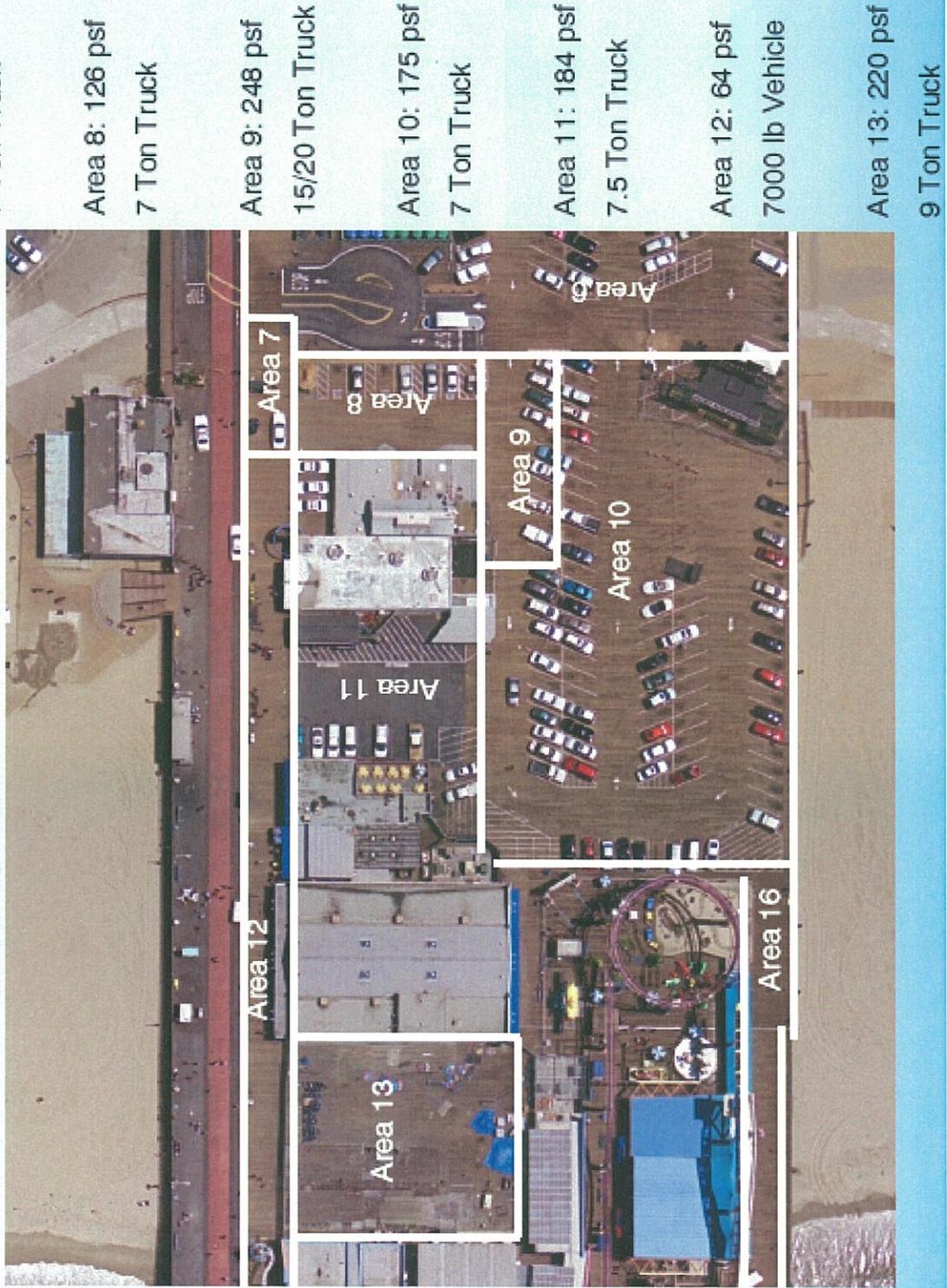
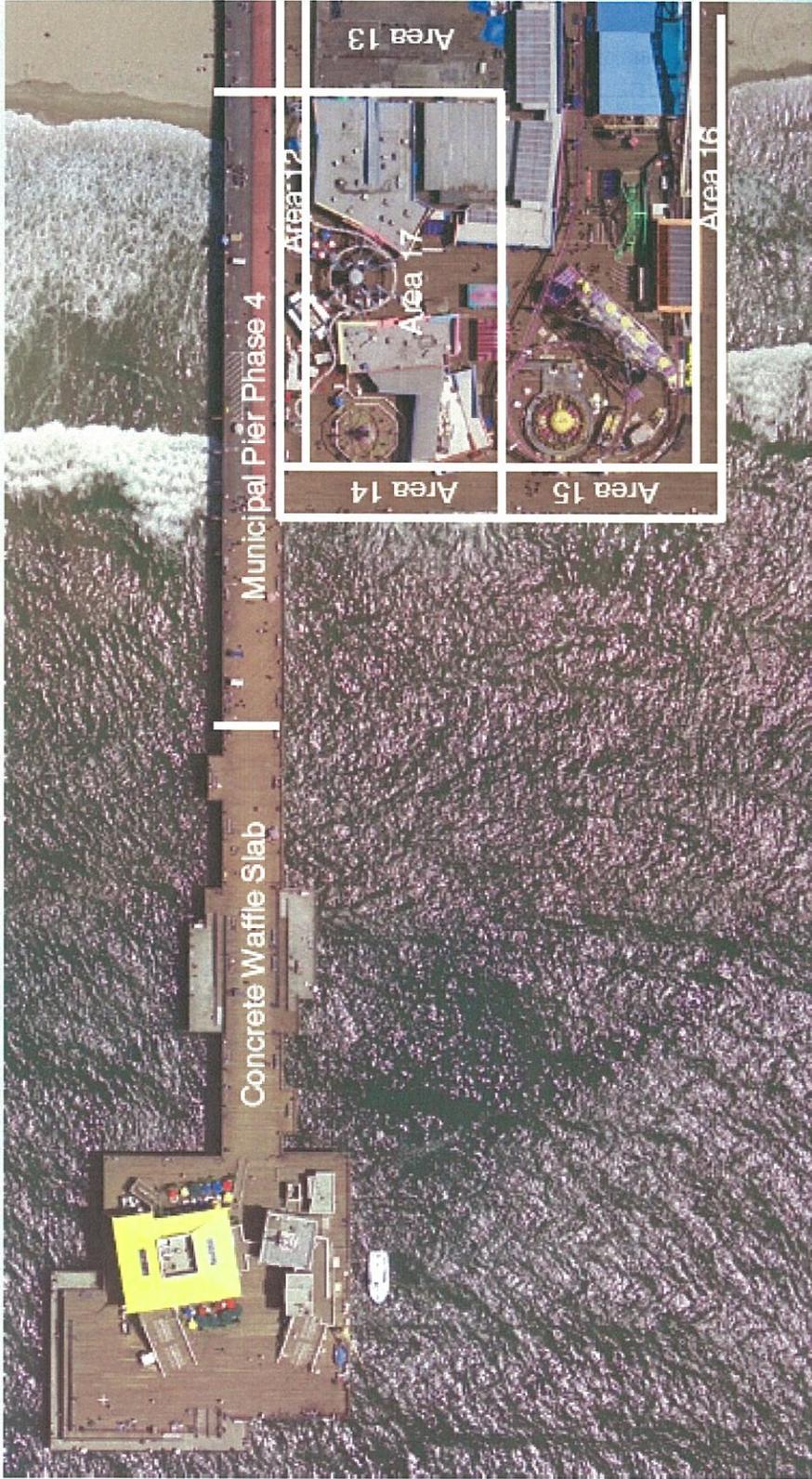


Figure 2

Upgrade Studies - Structural



Area 14: 214 psf 7.7 Ton Truck	Area 15: 220 psf 9 Ton Truck	Area 16: 220 psf 12.4 Ton Truck	Municipal Phase 4: 175 psf 7.3 Ton Truck
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Figure 3

AQUARIUM ROOF ASSESSMENT (Carousel East Deck):

Under the North-East corner of the Newcomb Pier is the Santa Monica Aquarium which is operated by the “Heal the Bay” organization. See Figure 1. The roof of the aquarium serves as an extension of the deck of the Newcomb Pier East of the historic Carousel Building; extending East from Bent 3 between Pile Rows a and i.

The Aquarium Roof structure was analyzed in November 2006 by Next Step design, Inc. They found the stringers (floor joist) to be inadequate based on a code Live Load requirement of 100 pounds per square foot (psf). The calculation indicated a capacity to support a 50 psf live load in addition to the weight of the structure itself.

Moffatt & Nichol reviewed the calculations by Next Step and found that the calculation performed checked the adequacy of the existing members to carry the 50 psf live load, but did not do an iterative calculation to determine the actual capacity.

Moffatt & Nichol performed calculations to determine the maximum live load capacity and determined that the existing members can safely support 86 psf. This is still short of the code requirement of 100 psf. Moffatt & Nichol also checked the maximum vehicle load and determined that the existing structure could support a maximum 7000 pound vehicle. The two live load cases are not combinable. The roof can support either the uniform live load or the vehicle load but not both.

There are a couple of options available for this area. First, the existing 4”x10” at 16” on center stringers could be supplemented with either 3”x10” or 4”x10” stringers. The 3”x10” supplement would result in a live load capacity of 150 psf or a maximum vehicle weight of 12,000 pounds; while the 4”x10” supplement would increase the live load capacity to 180 psf or a 14,000 pound vehicle.

The 3”x10” supplement alternative would cost approximately \$ 325,000; while the 4”x10” supplement alternative would cost approximately \$ 331,000.

A second option would be to post a maximum occupancy sign to limit the actual loads.

However, because this area is a roof with a waterproofing layer, the cost of adding stringers will be higher than other areas of the pier. Upgrading would also be disruptive of the aquarium operations. Therefore, it is recommend that this area be left as it is unless the use changes.

Recommended load limits are as follows:

Uniform Load (Large Area) =	85 PSF
Concentrated Load = (Within 3’x20’ zone)	3400 Pounds
People = (7 SF/Person)	560 People
Tables and Chairs =	. No Restrictions
Vehicle = (On rare occasions)	7000 Pounds Maximum

Santa Monica Pier Upgrades
Upgrade Estimates
Aquarium Roof

JN 5332-02
September 5, 2008

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	EXTENSION	TOTALS
□ 3x10 Supplement Alternative						
1	Remove Decking	3947	SF	10.00	39,470	
2	Remove Roof Waterproofing	3947	SF	10.00	39,470	
3	Install Added 3x10@16	147	EA	480.00	70,560	
4	Install Sheathing & Waterproof	3947	SF	10.00	39,470	
5	Install Decking	3947	SF	18.00	71,046	
6					0	
7					0	
8					0	\$260,016
	SUB-TOTAL					\$260,016
	CONTINGENCY	25%		260,016	65,004	
□ □ TOTAL ESTIMATE						\$325,020

□ 4x10 Supplement Alternative						
1	Remove Decking	3947	SF	10.00	39,470	
2	Remove Roof Waterproofing	3947	SF	10.00	39,470	
3	Install Added 4x10@16	147	EA	512.00	75,264	
4	Install Sheathing & Waterproof	3947	SF	10.00	39,470	
5	Install Decking	3947	SF	18.00	71,046	
6					0	
7					0	
8					0	\$264,720
	SUB-TOTAL					\$264,720
	CONTINGENCY	25%		264,720	66,180	
□ □ TOTAL ESTIMATE						\$330,900

MUNICIPAL PIER PHASE 4

The Santa Monica Municipal Pier is in the process of being upgraded to H-20 (Twenty-ton truck) capacity to provide adequate access for commercial deliveries to pier supported businesses, pier maintenance vehicles and equipment, and fire fighting equipment. The pier has already been upgraded (Phases 1 through 3) from the concrete access bridge (Bent 8) at the east end to Bent 40. This portion of the pier is entirely over the sandy beach and has all timber sub-structure.

The existing pier from Bent 40 to Bent 58 is in the tidal and surf zone, and is timber construction with a substructure consisting of five pile bents, caps and cross-bracing, with 4"x16" stringers at 24" o.c. and timber diagonal decking with asphalt and steel plate topping. This section of pier has a calculated capacity to support only an 18,000 pound vehicle, which is less than half the weight of the design vehicle.

It was recommended by Moffatt & Nichol that the portion of the pier over water (Phase 4, Bent 40 to Bent 58)) be constructed with concrete piles and pile caps with timber stringers and decking similar to the Pacific Park area constructed in 1987. Using concrete will result in higher durability and lower maintenance in the harsh surf zone. This recommendation has been approved by the City and the PRC and plans prepared accordingly.

The new structure will have prestressed concrete piles, cast-in-place concrete pile caps and longitudinal struts and no cross-bracing. The stringers and decking will be the same as used on the Phase 3 upgrade of 2006; 4"x16" stringers at 12" o.c. with 3"x12" decking. A typical cross-section is shown in Figure 4.

The proposed Phase 4 upgrade of the Municipal Pier is estimated to have a construction cost of \$4,800,000.

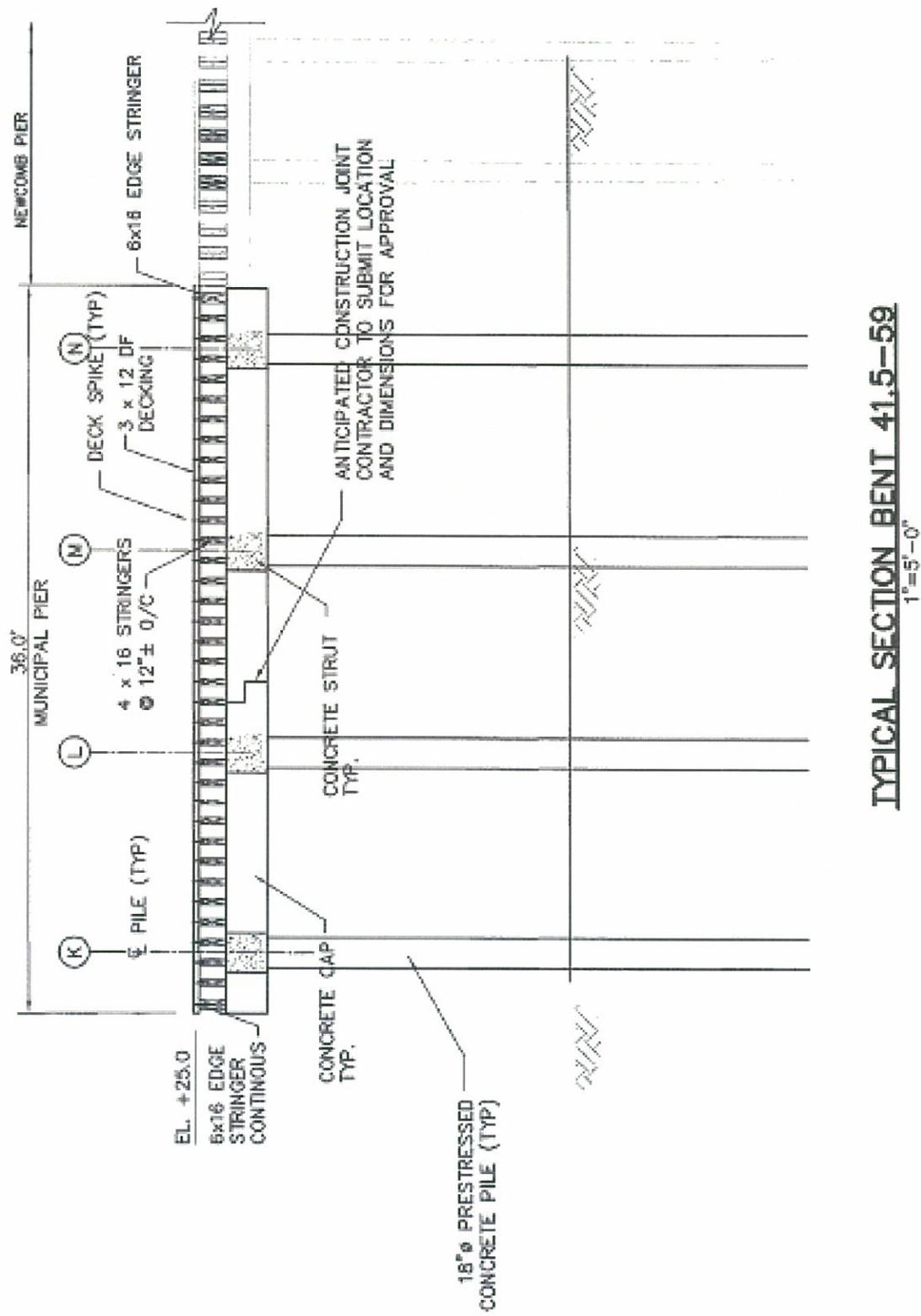


Figure 4

MUNICIPAL PIER CONCRETE UPGRADE (Seaward of Bent 59)

The Municipal Pier beyond Bent 59 was reconstructed in 1989 or 1990 using prestressed concrete piles and a concrete horizontal open grid (waffle slab) with solid elements at 2'-6" on center each direction leaving 24"x24" voids between. The waffle slab is 16" thick and supports timber decking over 3"x6" wood nailing strips laid flat over the longitudinal concrete elements. At each pile the voids are omitted creating an approximate 8'x8' solid concrete cap. While the piles on the structure are individual and not actually arranged in bents, Moffatt & Nichol have assigned Bent numbers to piles in rows transverse to the pier.

Our analysis of the existing concrete portion of the Municipal Pier revealed that the existing structure is not capable of supporting the H-20 (20 ton) truck loading requested by the Fire Department. This structure is a concrete waffle slab design with an eccentric pile layout. The nature of the structure does not lend itself to strengthening by adding structural members such as the stringers on the Newcomb Pier.

Strengthening of the existing members is necessary to handle the additional loading requirements. Due to the size of the members, supplementing the reinforcing steel and deepening the members is not practical. Therefore, Moffatt & Nichol propose the use of externally applied carbon fiber reinforcing for both bending and shear capacities.

The proposed strengthening would be accomplished by epoxy bonding carbon fiber strips to both the bottom and top of the waffle slab beams and then wrapping the beam with carbon fiber reinforced fabric. The carbon reinforcing elements would be painted with concrete grey colored epoxy paint.

There are two alternatives for upgrading the waffle slab as follows:

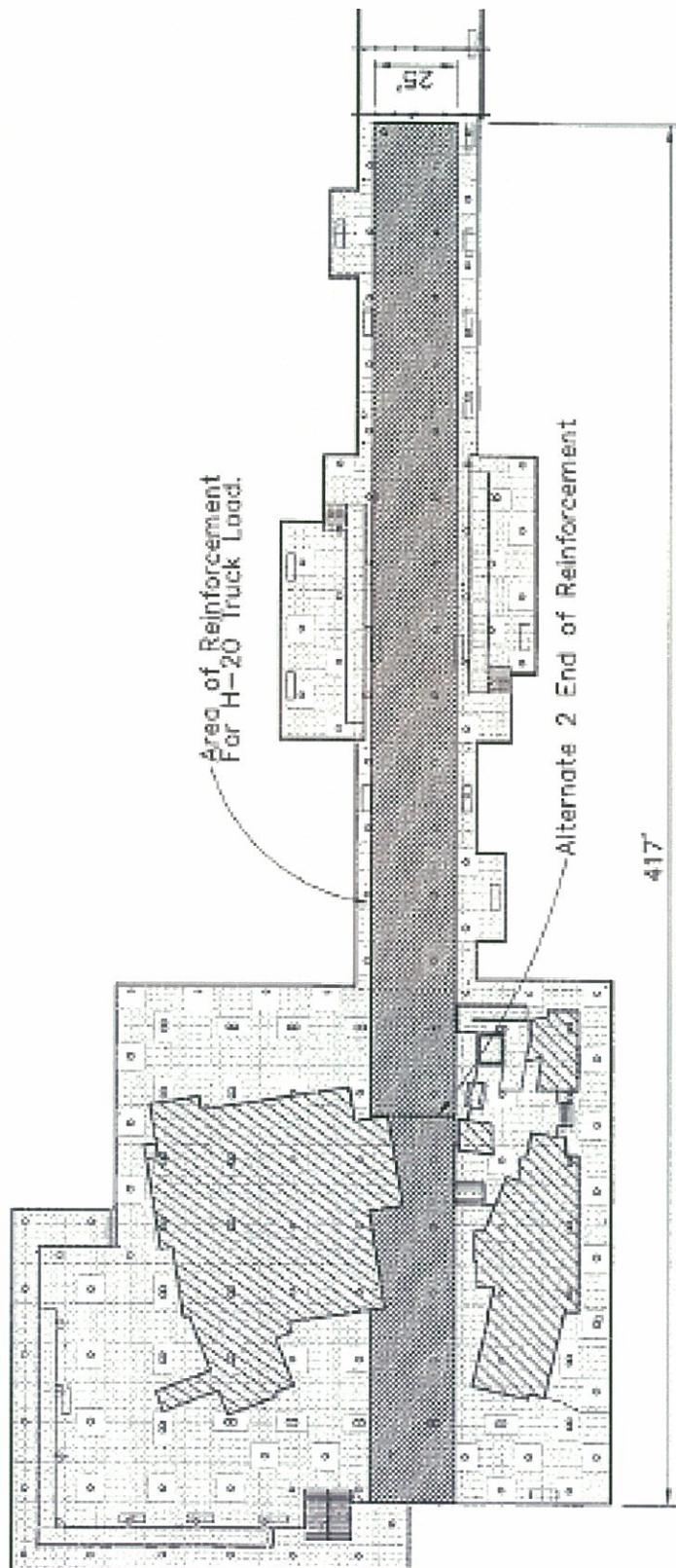
For Alternative 1, the reinforcing would be applied to a 25 foot wide by 417 foot long lane extending from the easterly end of the waffle slab, between the two buildings to the westerly edge of the platform.

For Alternative 2, the reinforcing would extend from the easterly end of the waffle slab to the South-east corner of the Restaurant on the end platform (Bent 89) rather than the seaward edge. This alternative would provide the H-20 capacity to the end platform but not beyond the Easterly edge of the buildings.

The Figure 5 on the following page shows the estimated limits of the upgrade, and a typical section through a waffle slab beam.

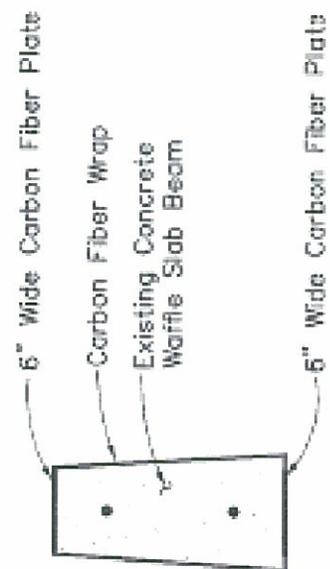
The existing decking is also inadequate to handle the wheel loads of an H-20 vehicle. Moffatt & Nichol recommend using an imported hardwood such as EKKI or Greenheart, which will handle the greater load using the same thickness of wood as the existing decking.

The proposed upgrade to the waffle slab portion of the Municipal Pier is estimated to have a construction cost of \$3,800,000.



PLAN
1"=50'

CONCEPT DRAWING
WAFFLE SLAB REINFORCEMENT
FOR H-20 TRUCK LOADS



DETAIL
1"=1'-0"

Figure 5

EMERGENCY EVACUATION GANGWAY

An emergency evacuation facility at the outer platform of the pier is necessary in case of fire or other emergency makes passage on the existing pier towards shore impossible or highly dangerous.

To provide this needed facility two alternatives are presented. Both alternatives can be stowed at deck level away from wave action and lowered when necessary to allow evacuation of people from the pier deck to waiting boats. Both alternatives also feature an independent pile/dolphin fender system. See Figure 6 for the locations of both alternatives.

Alternative 1 is an electric winch operated stair and gangway system, which would be, constructed using steel and fiberglass components. From the top platform to the intermediate platform there are 21 steps with eleven-inch treads and eight-inch risers. From the intermediate platform to the boat is a variable slope ramp with a 3 horizontal to one vertical maximum slope. Both the stairs and the ramp would have a 3'-8" clear width. The stairs, intermediate platform and ramp will be raised and lowered by two independent electric winches with an operator controlled push button control system. The winches are supported above deck level on a fabricated steel truss system.

A preliminary layout was prepared using a similar facility constructed on the Imperial Beach Pier as a model. The preliminary layout is shown on Figures 7 & 8.

It is estimated that the construction cost of this system will be \$500,000.

Alternative 2 is an electric winch operated single ramp featuring a fabricated aluminum ramp and lower platform which will be raised and lowered by a single split drum electric winch with an operator controlled push button control system. The upper platform will be fabricated steel connected to the concrete deck of the pier and supported by a single pile. From the upper platform to the lower platform is a variable slope ramp with a maximum slope of 3.36 horizontal to one vertical. The ramp would have a 3'-8" clear width. The lifting cables are supported by a fixed jib crane mounted on the existing concrete deck over one of the existing piles.

A preliminary layout was prepared using a similar facility constructed on Stearns Wharf in Santa Barbara as a model. The preliminary layout is shown on Figures 9 & 10.

The estimated construction cost for Alternative 2 is approximately \$ 700,000.

Since each alternative system is electrically operated, and a fire on the pier approach would likely cut land based electrical power, it will be necessary to have an emergency generator or high voltage battery power pack located on the end platform. There is also an option to have a hand crank backup for lowering the ramp in an emergency. While hand cranking is possible, the gear ratio to support the weight will be on the order of 200:1 resulting in 200 revolutions of the crank (or wheel) for one revolution of the drum resulting in approximately 3 to 4 feet of vertical movement depending on the drum diameter.

Because the pier is high above the water, it is not possible to construct a self-navigated exit facility for people who cannot descend stairs or steep ramps without assistance. Therefore, it is necessary for

personnel be trained to assist physically challenged pier visitors down the exit stairs and/or ramp, and that they be assigned to that task if an evacuation is needed.

Upgrade Studies – Fire Safety

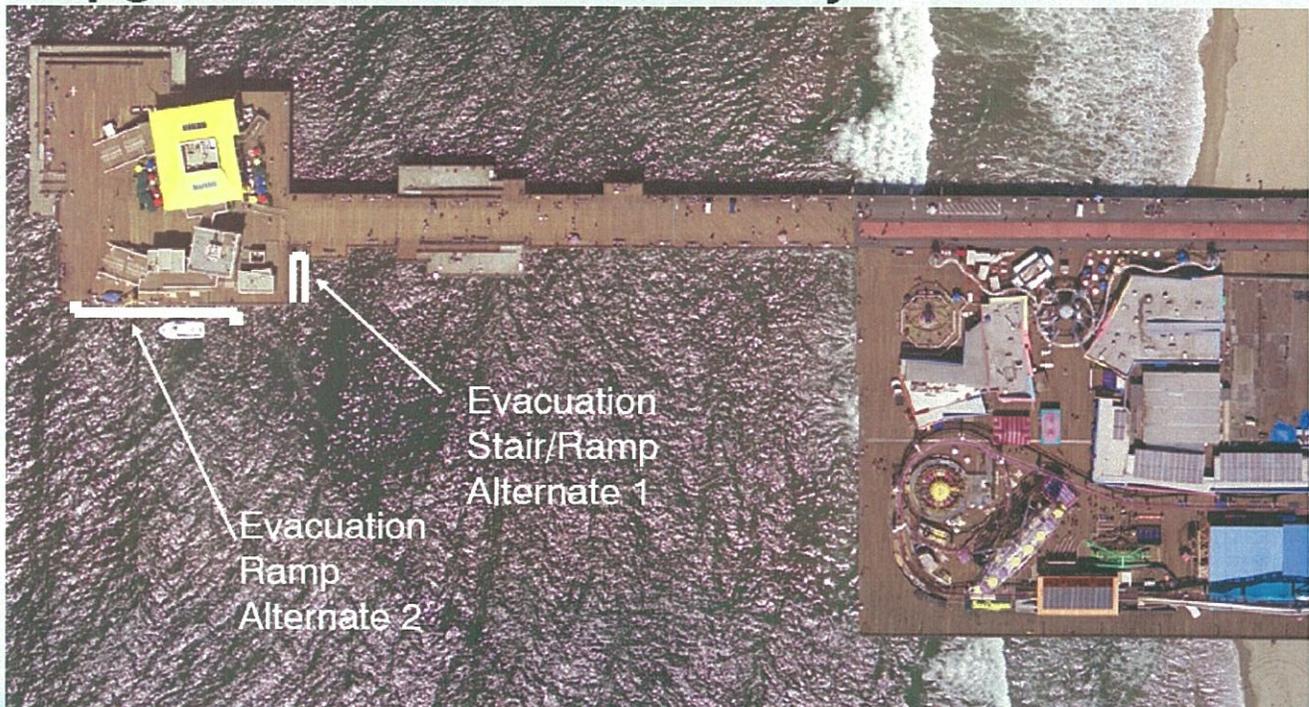


Figure 6

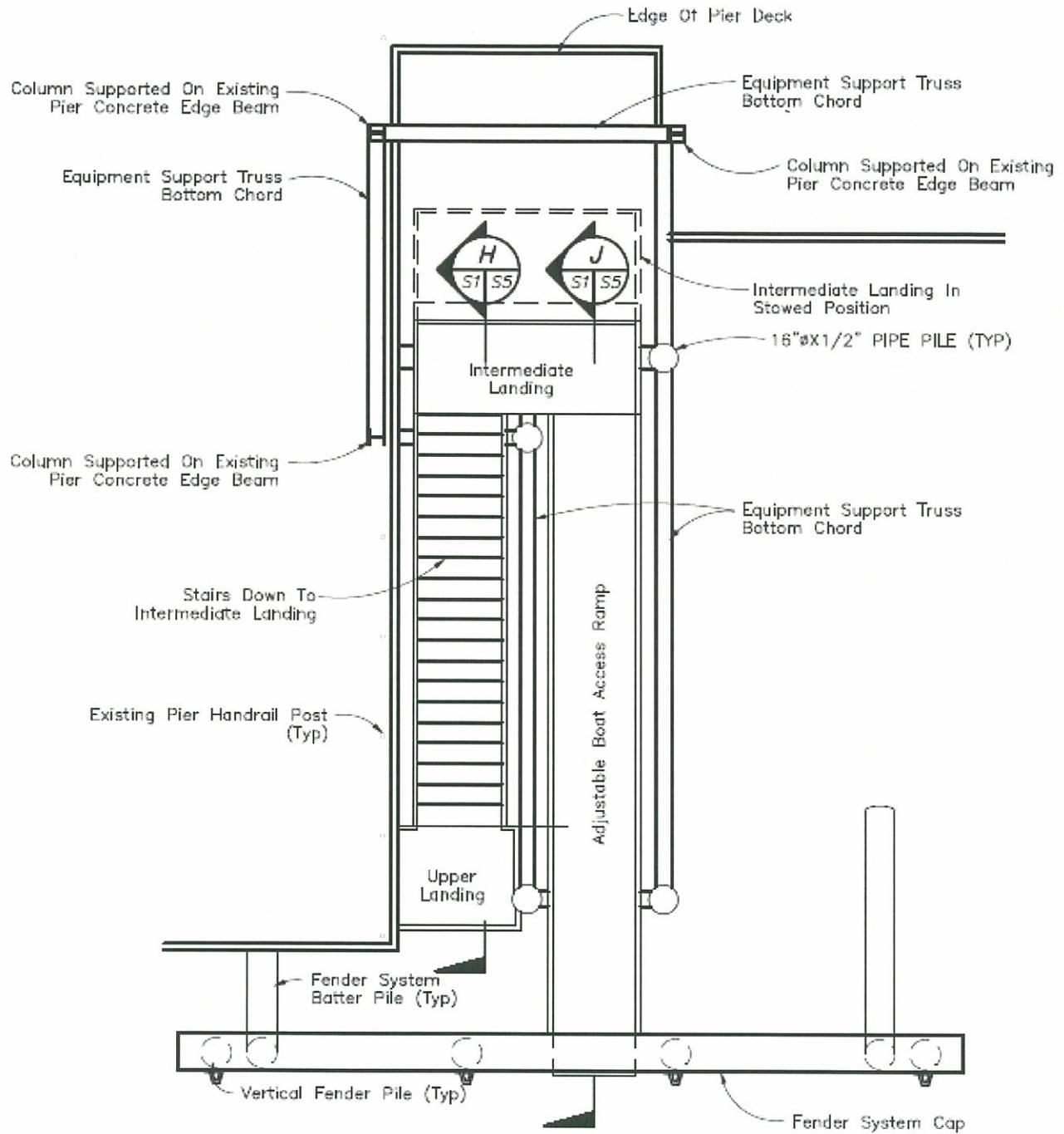
In an Interdepartmental Communication from Mike Braaten, Sergeant of the SMPD Harbor Patrol, to Mark Cuneo, Principal Engineer with the Santa Monica Department of Civil Engineering and Architecture, preference was stated for Alternative 1 of the Emergency Evacuation Ramp. This preference is based on how the location of the ramp would effect the ongoing day-to-day operations of the SMPD Harbor Patrol. The full memorandum is included in the appendix of this report.

Santa Monica Pier Upgrades

Upgrade Estimates
Municipal Pier Upgrades

JN 5332-02
September 5, 2008

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	EXTENSION	TOTALS
Phase 4						
1	Remove Existing	1	LS	183,000	183,000	
2	Protect & Relocate Utilities	1	LS	200,000	200,000	
3	New Concrete Sub-Structure	1	LS	1,110,200	1,110,200	
4	New Timber Super-Structure	1	LS	584,500	584,500	
5	New Catwalk & Access Ways	1	LS	75,600	75,600	
6	Reinstall Amenities & Misc	1	LS	396,700	396,700	
7	Construction Trestle	1	LS	1,000,000	1,000,000	
8	Mob-Demob, traffic. Etc	1	LS	120,000	120,000	
9	Contingencies	1	LS	734,000	734,000	
10	CM & I	1	LS	367,000	367,000	
TOTAL ESTIMATE						\$4,771,000
Waffle Slab						
1	Longitudinal Beams	1735	EA	560.00	971,600	
2	Transverse Beams	1735	EA	560.00	971,600	
3	Remove Existing Decking	13735	SF	5.00	68,675	
4	New Hardwood Decking	13735	SF	21.00	288,435	
5	Access Mobilization	13735	SF	50.00	686,750	
6	Contingencies	15%		2,987,060	448,059	
7	CM & I	10%		3,435,119	343,511	
8					0	
TOTAL ESTIMATE						\$3,778,630
Evacuation Ramp - Alternative 1						
1	Piles 16"Øx.5"x 70'	10	EA	11,750.00	117,500	
2	Pile Coating 16"Øx 40'	10	EA	480.00	4,800	
3	Fabricated Steel Framing	13.0	Ton	2,400.00	31,270	
4	Fiberglass Grating	235.0	SF	25.00	5,875	
5	Pile Clamps	6	EA	1,200.00	7,200	
6	Railing	135.33	LF	200.00	27,066	
7	Fenders	4	EA	25,000.00	100,000	
8	Hoist System	1	LS	100,000.00	100,000	
9	Contingencies	15%		393,711.00	59,056	
10	CM & I	10%		452,767.00	45,276	
TOTAL ESTIMATE						\$498,043
Evacuation Ramp - Alternative 2						
1	Piles 16"Øx.5"x 70'	10	EA	11,750.00	117,500	
2	Pile Coating 16"Øx 40'	10	EA	480.00	4,800	
3	Upper Landing	1	EA	10,000.00	10,000	
4	Ramp & Lower Landing	1	LS	120,000.00	120,000	
5	Pile Clamps & Fender Bracket	2	LS	45,000.00	90,000	
6	Fixed Crane	1	LS	25000.00	25,000	
7	Fenders	5	EA	25000.00	125,000	
8	Hoist System	1	LS	60,000.00	60,000	
9	Contingencies	15%		552,300.00	82,845	
10	CM & I	10%		635,145.00	63,514	
TOTAL ESTIMATE						\$698,659



PLAN AT DECK ELEVATION

Figure 7

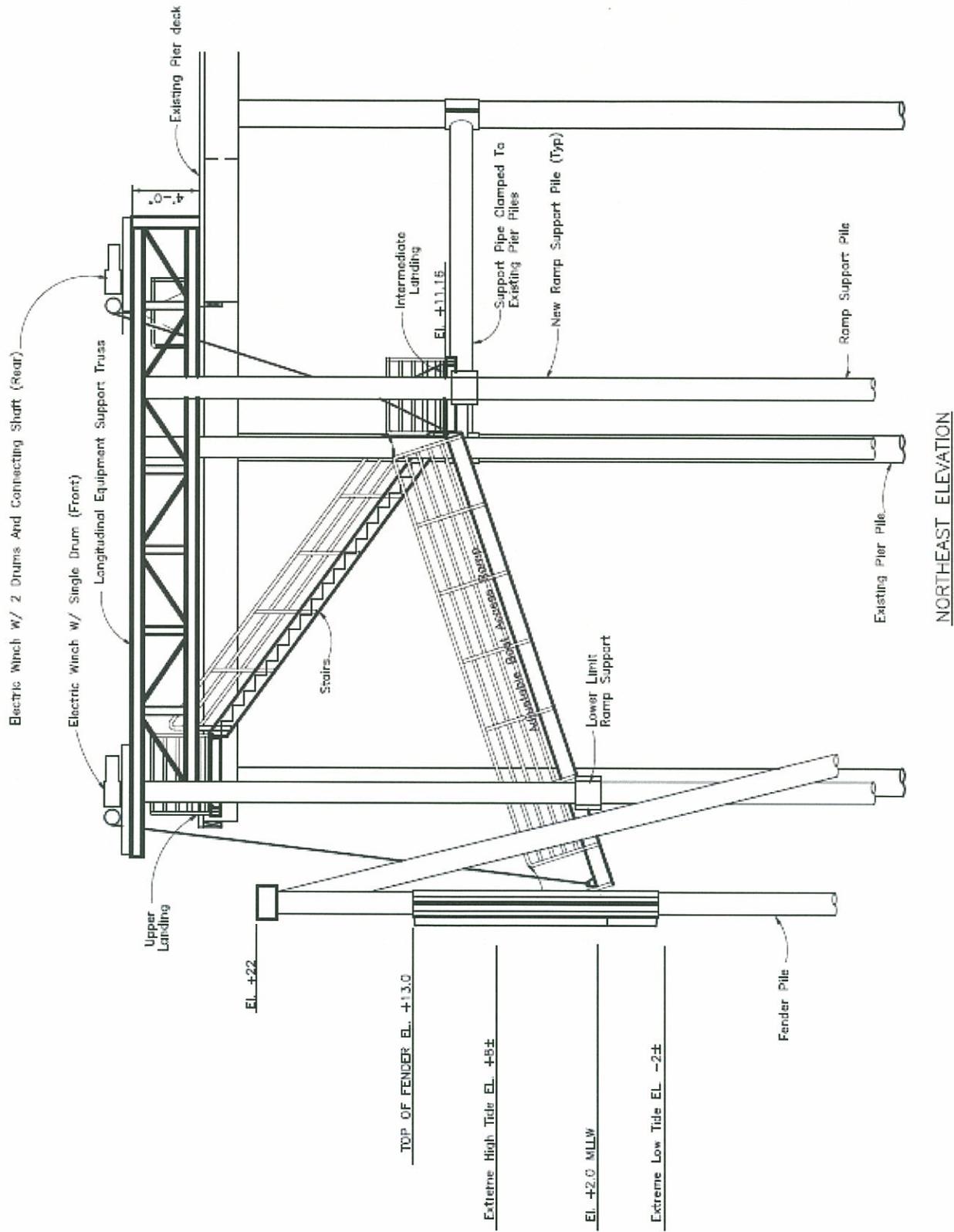


Figure 8

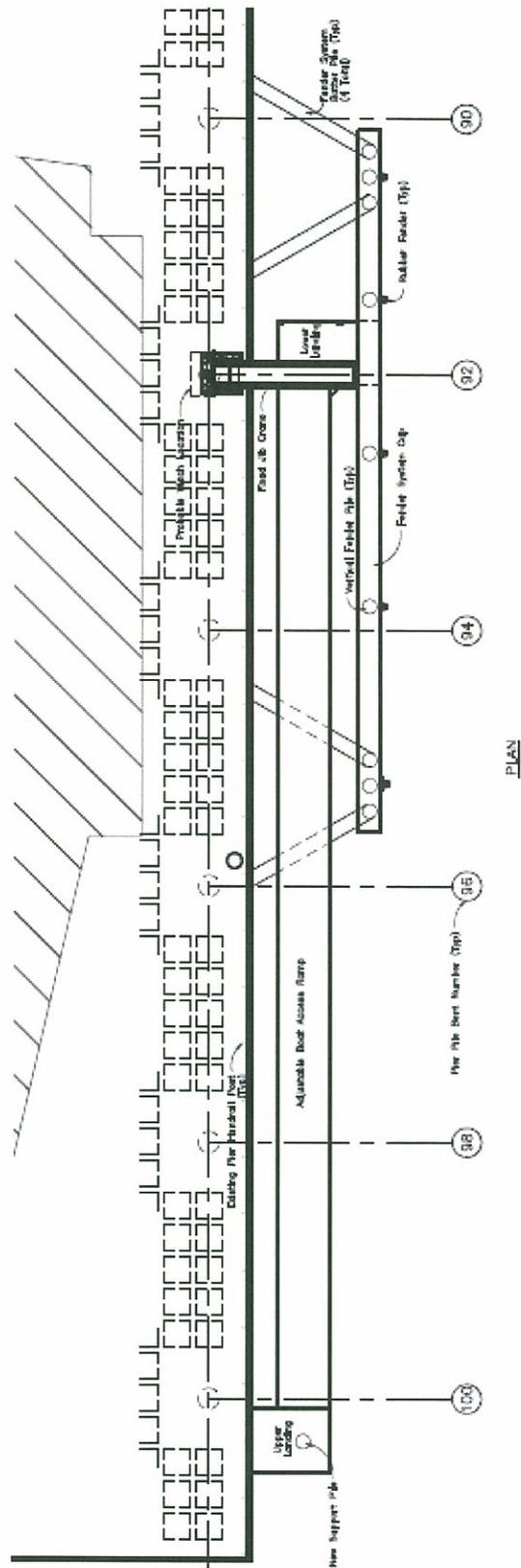


Figure 9

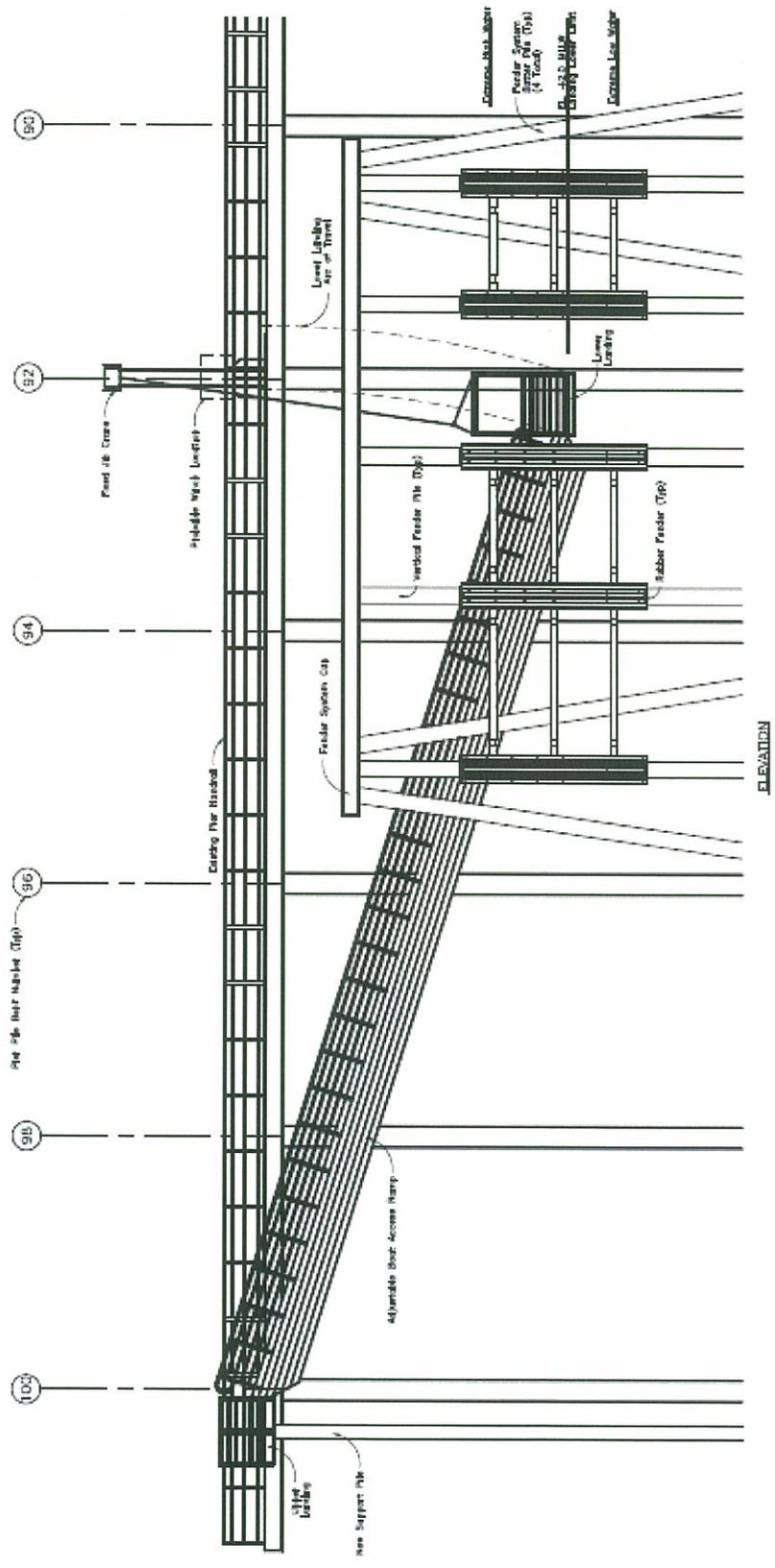


Figure 10

CAROUSEL CUPOLA ONION DOME

Approximately 10 years ago the roof of the historic carousel building was repaired and the cupola partially restored. Although plans were prepared for the “Onion” dome top of the cupola, it was not constructed at that time.

Construction of the missing “Onion” dome is included as part of the total pier upgrade program. Drawings of the carousel building elevation both with and without the “Onion” dome are shown on the Figures 11 and 12 respectively.

The cost to construct the dome on the cupola as shown on those plans was estimated for both stainless steel and anodized aluminum.

For the stainless steel alternative the elements of the smaller onion shape are estimated using 3/4”x3/4” solid bars rather than small tubes as show on the original plans. The larger onion shape uses the original tube shapes. The finial at the top would be a solid turned shape. The estimated cost of this alternative is approximately \$50,000.

For the anodized aluminum alternative, all of the elements of both onion shapes are tubular sections, and the finial is a solid turned shape. The estimated cost of this alternative is approximately \$45,000.

These estimates are shown on the following page.

Santa Monica Pier Upgrades
 Upgrade Estimates
 Carousel Building Onion Dome

JN 5332-02
 September 5, 2008

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	EXTENSION TOTALS
□ Stainless Steel Alternative					
1	Large Dome Ribs 2x6 T.S.	98.64	LF	82.88	8,175
2	Small Dome Ribs .75x.75 Bar	22.29	LF	16.84	375
3	Finial	1	LS	800.00	800
4	Tension Ring Connector	1	LS	850.00	850
5	Bottom Connections	8	EA	200.00	1,600
6	Installation Crane	1	LS	25000	25,000
7	Cupola Roof	1	LS	3000	3,000
8					0
					<u>\$39,800</u>
	SUB-TOTAL				\$39,800
	CONTINGENCY	25%		39,800	9,950
					<u><u>\$49,750</u></u>
□ □ TOTAL ESTIMATE					\$49,750

□ Anodized Aluminum Alternative					
1	Large Dome Ribs 2x6 T.S.	98.64	LF	49.73	4,905
2	Small Dome Ribs .75x.75 T.S.	22.29	LF	10.10	225
3	Finial	1	LS	700.00	700
4	Tension Ring Connector	1	LS	600.00	600
5	Bottom Connections	8	EA	150.00	1,200
6	Installation Crane	1	LS	25000	25,000
7	Cupola Roof	1	LS	3000	3,000
8					0
					<u>\$35,630</u>
	SUB-TOTAL				\$35,630
	CONTINGENCY	25%		35,630	8,907
					<u><u>\$44,537</u></u>
□ □ TOTAL ESTIMATE					\$44,537

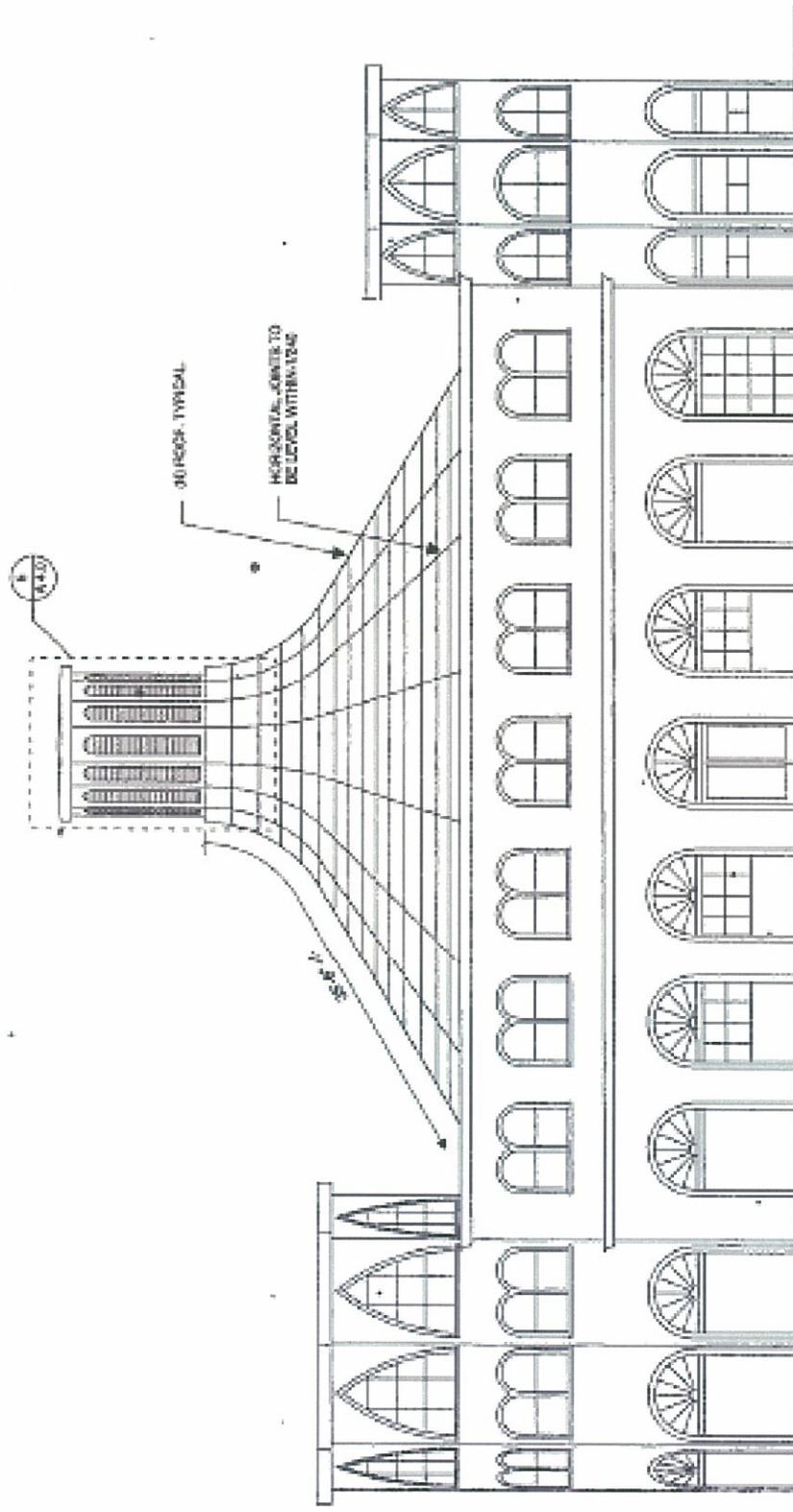


Figure 11

1

ELEVATION @ PIER CAROUSEL BLDG.
SCALE 1/8"=1'-0"

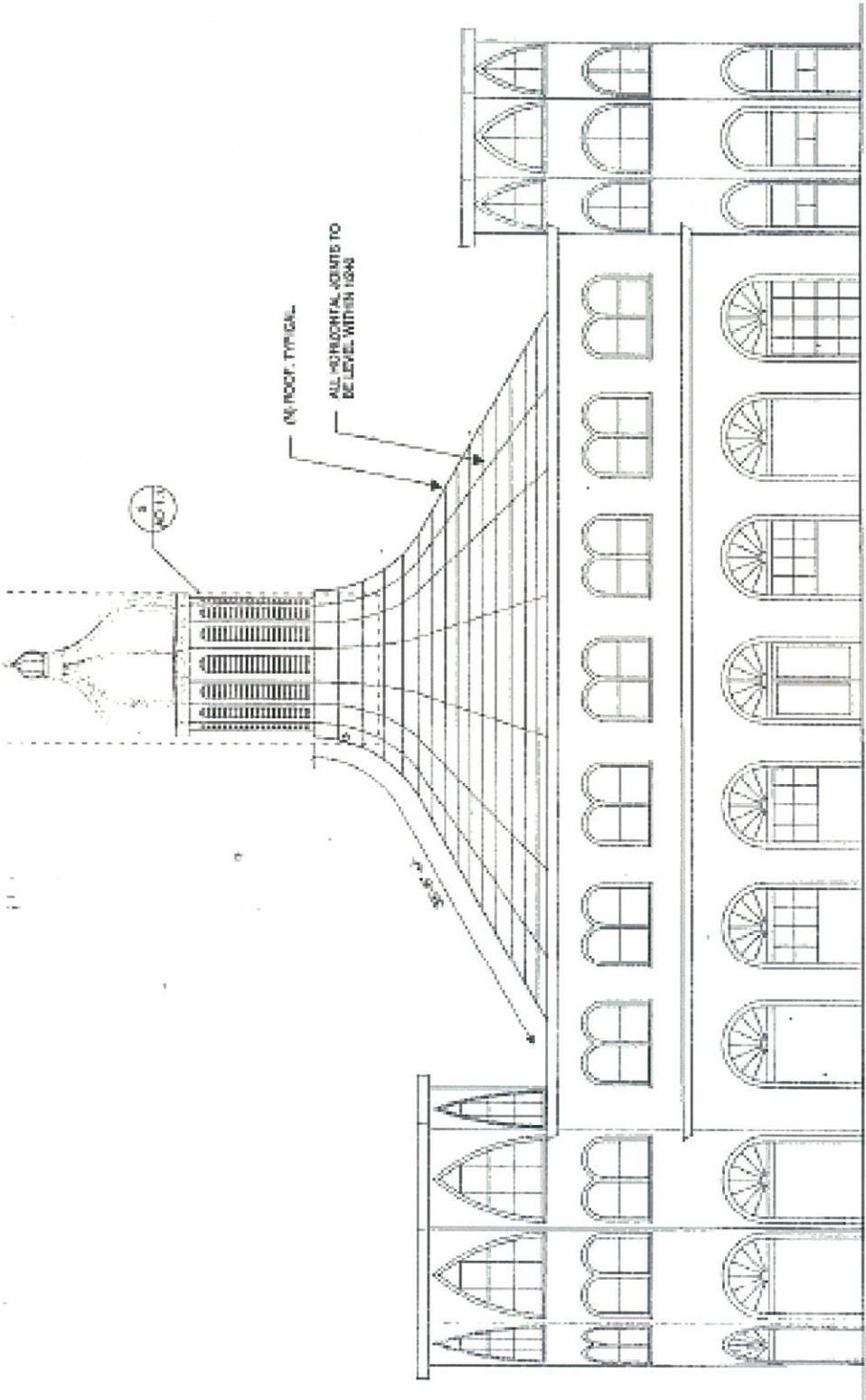


Figure 12

ELEVATION @ PIER CAROUSEL BLDG. 1

FIRE PROTECTION SYSTEM

The 2008 condition assessment did not find any conditions in the Fire Protection System that would render it inoperative in needed under a fire emergency. The assessment inspection did reveal conditions which would reduce the effectiveness of the system which need upgrade or repair. These conditions include blocked sprinkler heads and inadequate structural supports of the piping. These are detailed in the assessment report and should be scheduled for remedial action as soon as practical.

The estimated construction cost for the repairs identified during the inspection is \$55,000.

Additional upgrades to the fire protection systems on the Santa Monica Pier are recommended beyond the correction of deficiencies identified in the assessment report. These upgrades include the installation of a dry standpipe system to supplement the hydrants currently in place, and installation of additional in-line control valves to better isolate breaks in the existing system and keep the remaining system operating.

Dry Standpipe System:

For estimating purposes the proposed dry standpipe system consist of a 6” main header the full length of the pier with one standpipe every 100 feet using a 4” branch pipe and appropriate valves. Pipes will be steel with Victaulic couplings and protective coating.

The estimated construction cost for the dry standpipe system is \$185,000.

New Fire Main Valves:

It is recommended that the new valves be placed at approximately 500 feet apart which mean three new valves would be installed. In order to install the valves, the system will need to be drained. Therefore, it is recommended that all three valves be installed at the same time to reduce the number of times and the total duration that the system is off line. It is not anticipated that a temporary fire line will be required while these valves are installed.

The estimated construction cost for the installation of three new in-line control valves is \$25,000.

The following four pages present the items from the assessment report needing attention with the cost associated with the repairs added. The next seven pages are a breakdown estimate of the Dry Standpipe System., prepared by Spec Systems.



MOFFATT AND NICHOL
SANTA MONICA PIER
FIRE PROTECTION UPGRADE REPORT

REV.	DESCRIPTION	BY	DATE	REVIEWED	DATE	APPROVED	DATE
0	ISSUED TO CLIENT	PCY	12/17/07	JAD	12/17/07	JAD	12/17/07
JOB NO.: 4096							
DRAWING / CALCULATION NO.: 4096-MR-02						REV. 0	



PROJECT:	SANTA MONICA PIER	PROJ. NO.:	4096
CLIENT:	MOFFATT AND NICHOL	SHEET:	2 of 2
SUBJECT:	FIRE PROTECTION SYSTEM UPGRADE REPORT	DATE:	12/17/2007
		BY:	PCY
		CHKD:	JAD

Purpose:

The City of Santa Monica has requested budgetary pricing for repair of the items found during the Pier Assessment Study as well as upgrades to the pier fire protection systems. The upgrades to the fire system consist of installation of a dry standpipe system along the entire length of the pier and installation of isolation valves in the existing fire water system such that a portion of the system may be removed from service without impairing the entire system.

Repair Estimates:

The table in Attachment A indicates the estimated cost of repair for each of the items that was found and documented during the assessment portion of the project. The cost estimate assumes that a sufficient number of the items will be done at the same time. Doing a small number of the items will likely increase the cost.

Dry Standpipe System Estimate:

The City Fire Marshall has requested that a dry standpipe system be considered to supplement the existing hydrant system on the pier. The estimate of approximately \$185,000 is provided in Attachment B for the dry standpipe system. The assumptions are noted on the estimate.

Installation of In-Line Control Valves Estimate:

The City Fire Marshall has requested that two or three in-line control valves be added to the existing fire main system on the pier in order to allow maintenance on sections of the system while allowing water supply up to the isolated section. It is recommended to install one valve every 500' (+/-). Therefore a total of three valves should be installed. In order to install the valves, the system will need to be drained. Therefore all three valves should be installed at the same time. Installation of the valves is estimated at \$25,000. This includes draining of the water in the line, cutting the pipe and purchasing and installation of the valves. It is not anticipated that a temporary fire water system will be required while these valves are installed.

Attachments:

- A. Assessment Exhibit Costs
- B. Dry Standpipe System Estimate

ATTACHMENT A
ASSESSMENT EXHIBIT COSTS

PILE #	DISTANCE/DIRECTION	UTILITY	GRADE/CONDITION	PHOTOS	COMMENTS	ESTIMATED COST TO REPAIR	REPAIR REQUIRED
3 k/l		Sprinkler System	P	1	Sprinkler adjacent to beam- blocked pattern	\$ 800	Install new sprinkler on other side of beam
3z		Sprinkler System	F	2	Spray pattern blocked by planks above	\$ 800	Relocate sprinkler so pattern is not blocked
3.5 h/l		Sprinkler System	P	3	Cage dislodged	\$ 50	Remove cage
4e		Sprinkler System	P	4	Sprinkler blocked by plastic	\$ 100	Remove plastic
5d		Sprinkler System	P	5	Sprinkler blocked by plastic	\$ 100	Remove plastic
8M		Sprinkler System	P	6	Sprinkler blocked by beam/cage dislodged	\$ 800	Install new sprinkler on other side of beam
7M		Sprinkler System	F	7	Additional support needed	\$ 400	Furnish and install new support
10O		Sprinkler System	F	8	Additional support needed	\$ 400	Furnish and install new support
9h		Sprinkler System	F	9	Support requires adjustment	\$ 100	Adjust existing support
10i		Sprinkler System	F	10	Additional support needed	\$ 400	Furnish and install new support
10k		Sprinkler System	B	11	Wires blocking sprinkler	\$ 100	Remove or relocate wires to avoid sprinkler
10z		Sprinkler System	B	12	Wood/JB blocking sprinkler	\$ 400	Relocate sprinkler so pattern is not blocked
11o		Sprinkler System	B	13	Deflector bent	\$ 200	Replace sprinkler
12o		Sprinkler System	B	14	Deflector bent	\$ 200	Replace sprinkler
13a		Sprinkler System	F	15	Sprinkler wrapped with wires	\$ 100	Remove or relocate wires to avoid sprinkler
12p		Sprinkler System	F	16	Additional support needed	\$ 400	Furnish and install new support
16i		Sprinkler System	F	17	Additional Support needed (two lines)	\$ 400	Furnish and install new support
14O		Sprinkler System	F	18	Additional support needed	\$ 400	Furnish and install new support
18K		Sprinkler System	F	19	Wire support needs to be replaced	\$ 400	Furnish and install new support
18N		Sprinkler System	F	20	Pipe not in support	\$ 400	Furnish and install new support
18a		Sprinkler System	F	21	Bent support needs adjustment	\$ 200	Straighten support
18e		Sprinkler System	B	22	Deflector bent	\$ 200	Replace sprinkler
18h		Sprinkler System	B	23	Deflector bent	\$ 200	Replace sprinkler
18o		Sprinkler System	P	24	Bent support needs adjustment/replacement	\$ 400	Furnish and install new support

PILE #	DISTANCE/ DIRECTION	UTILITY	GRADE/ CONDITION	PHOTOS	COMMENTS	ESTIMATED COST TO REPAIR	REPAIR REQUIRED
19w		Sprinkler System	B	25	Deflector bent	\$ 200	Replace sprinkler
19t		Sprinkler System	B	26	Plank blocking sprinkler	\$ 800	Install new sprinkler on other side of beam
19h		Sprinkler System	P	27	Conduit blocking sprinkler	\$ 800	Reroute conduit to avoid blocking sprinkler pattern
19M		Sprinkler System	P	28	Bent support needs adjustment	\$ 400	Straighten support
20r		Sprinkler System	F	29	Bent support needs adjustment	\$ 400	Straighten support
21z		Sprinkler System	F	30	Conduit blocking sprinkler	\$ 800	Reroute conduit to avoid blocking sprinkler pattern
21L		Sprinkler System	P	31	Support missing from end of pipe	\$ 400	Furnish and install new support
23n		Sprinkler System	B	32	Support broken	\$ 400	Furnish and install new support
23O		Sprinkler System	F	33	Conduit blocking sprinkler	\$ 400	Reroute conduit to avoid blocking sprinkler pattern
23a		Sprinkler System	B	34	Support needs to be reinstalled	\$ 400	Furnish and install new support
24a		Sprinkler System	P	35	Bent support	\$ 400	Straighten support
24j		Sprinkler System	B	36	Broken support	\$ 800	Furnish and install new support
24aa		Sprinkler System	F	37	Support bent, replace with regular support	\$ 800	Furnish and install new support
25r		Sprinkler System	B	38	Additional support needed	\$ 800	Furnish and install new support
25m		Sprinkler System	B	39	Beam blocking sprinkler	\$ 800	Relocate sprinkler so pattern is not blocked
25l		Sprinkler System	B	40	Support needs to be reinstalled	\$ 400	Reinstall support
25k		Sprinkler System	B	41	Mainline support broken	\$ 800	Furnish and install new support
25j		Sprinkler System	B	42	Support needs to be reinstalled	\$ 400	Reinstall support
25h		Sprinkler System	B	43	Deflector bent	\$ 200	Replace sprinkler
25g		Sprinkler System	P	44	Beam blocking sprinkler	\$ 800	Install new sprinkler on other side of beam
25f		Sprinkler System	B	45	Deflector bent	\$ 200	Replace sprinkler
25c		Sprinkler System	P	46	Plumbers tape needs to be replaced with regular support	\$ 800	Furnish and install new support
25a		Sprinkler System	P	47	Support missing	\$ 800	Furnish and install new support

PILE #	DISTANCE/ DIRECTION	UTILITY	GRADE/ CONDITION	PHOTOS	COMMENTS	ESTIMATED COST TO REPAIR	REPAIR REQUIRED
25O		Sprinkler System	P	48	Beam blocking sprinkler	\$ 800	Install new sprinkler on other side of beam
25N		Sprinkler System	B	49	Deflector bent	\$ 200	Replace sprinkler
26K		Sprinkler System	B	50	Deflector bent	\$ 200	Replace sprinkler
26L		Sprinkler System	P	51	Support missing	\$ 800	Furnish and install new support
26c		Sprinkler System	P	52	Plank blocking sprinkler/pipe not supported by hanger	\$ 1,200	Furnish and install new support; install new sprinkler on other side of beam
26c		Sprinkler System	P	53	Pipe not supported by hanger	\$ 200	Repair hanger
26i		Sprinkler System	P	54	Beam blocking sprinkler	\$ 800	Install new sprinkler on other side of beam
26l		Sprinkler System	P	55	Beam blocking sprinkler	\$ 800	Install new sprinkler on other side of beam
27l		Sprinkler System	F	56	Support bent	\$ 200	Straighten support
27j		Sprinkler System	B	57	Support with wood block hanging from center line	\$ 800	Remove existing support and furnish and install new support
27h		Sprinkler System	B	58	Deflector bent	\$ 200	Replace sprinkler
27g		Sprinkler System	F	59	Hanger needs adjustment	\$ 200	Adjust existing support
27f		Sprinkler System	F	60	Hanger needs adjustment	\$ 200	Adjust existing support
27d		Sprinkler System	B	61	Plumbers tape needs to be replaced with regular support	\$ 800	Adjust existing support
27c		Sprinkler System	B	Similar to 61	Plumbers tape needs to be replaced with regular support	\$ 800	Furnish and install new support
27b		Sprinkler System	B	Similar to 61	Plumbers tape needs to be replaced with regular support	\$ 800	Furnish and install new support
26K		Sprinkler System	F	62	Corroded cage should be removed	\$ 50	Remove cage
28o		Sprinkler System	B	63	Deflector bent	\$ 200	Replace sprinkler
28p		Sprinkler System	B	64	Deflector bent	\$ 200	Replace sprinkler
28t		Sprinkler System	B	65	Deflector bent	\$ 200	Replace sprinkler
29n		Sprinkler System	P	66	Plank blocking sprinkler/replace wooden support with pipe hanger	\$ 1,200	Replace sprinkler Relocate sprinkler so pattern is not blocked; furnish and install new support

PILE #	DISTANCE/ DIRECTION	UTILITY	GRADE/ CONDITION	PHOTOS	COMMENTS	ESTIMATED COST TO REPAIR	REPAIR REQUIRED
290		Sprinkler System	B	67	Deflector bent	\$ 200	Replace sprinkler
30N		Sprinkler System	B	68	Plumbers tape needs to be replaced with regular support	\$ 800	Furnish and instal new support
31a		Sprinkler System	P	69	Conduit blocking sprinkler	\$ 800	Relocate sprinkler so pattern is not blocked
31a		Sprinkler System	B	70	Broken support needs to be reinstalled	\$ 400	Reinstall support
33a		Sprinkler System	B	71	Wood supporting pipe, replace with regular supports	\$ 800	Furnish and instal new support
33a		Sprinkler System	B	72	Wood supporting pipe, replace with regular supports	\$ 800	Furnish and instal new support
35f		Sprinkler System	B	73	Deflector bent	\$ 200	Replace sprinkler
35p		Sprinkler System	B	74	Deflector bent	\$ 200	Replace sprinkler
32s		Sprinkler System	B	75	Deflector bent	\$ 200	Replace sprinkler
38b		Sprinkler System	B	76	Remove corroded birudage	\$ 50	Remove support and wood
38c		Sprinkler System	B	77	Support dangling wood from pipe	\$ 50	Remove support and wood
38b		Sprinkler System	B	78	Wood supporting pipe, replace with regular supports	\$ 800	Furnish and instal new support
38c		Sprinkler System	B	79	Wood supporting pipe, replace with regular supports	\$ 800	Furnish and instal new support
39c		Sprinkler System	B	80	Deflector bent	\$ 200	Replace sprinkler
36j		Sprinkler System	B	81	Wood supporting pipe, replace with regular supports	\$ 800	Furnish and instal new support
38l		Sprinkler System	P	82	Replace old corroded support	\$ 800	Furnish and instal new support
36j		Sprinkler System	B	83	Hoop of support bent	\$ 200	Straighten support
37d		Sprinkler System	B	84	Deflector bent	\$ 200	Replace sprinkler
36O		Sprinkler System	B	85	Wire hangers need to be replaced with regular support	\$ 800	Furnish and instal new support
36n		Sprinkler System	B	86	Deflector bent	\$ 200	Replace sprinkler
38l		Sprinkler System	B	87	Support broken	\$ 800	Furnish and instal new support
30q		Sprinkler System	B	88	Bent support	\$ 200	Straighten support
30K		Sprinkler System	B	89	Deflector bent	\$ 200	Replace sprinkler
36O		Sprinkler System	B	90	Plumbers tape needs to be replaced with regular support	\$ 800	Furnish and instal new support

ATTACHMENT B
DRY STANDPIPE SYSTEM ESTIMATE



IPM

Overall Project Summary Account Basis

Project summary (direct and indirect costs). Direct costs presented at an account level. Indirect costs presented at a summary level.

Project Title: Santa Monica Pier Fire System
Project Name: 4096 Santa Monica Pier Dry System
Scenario Name: BaseCase
Project Location: US
Estimate Date: 17DEC07 13:54:24

Job No: 4096
Prep. By: JAD

Project Title: Santa Monica Pier Fire System
Project Location: US
Estimate Date: 17DEC07 13:54:24

Prepared By: JAD
Currency: DOLLARS USD



Project Notes

Assume dry stand pipe system for entire length of pier (1600')
Assume one stand pipe for every 100 feet (total of 16)
Main header is 6" and standpipe branches are 4"
Piping will be fabricated out of carbon steel with Victaulic connections
Piping will be coated with primer and finish coat
Detailed design/installation by C-16 contractor
Assumed freight cost of 4% of material cost
Assumed sales tax of 8.5% of material cost
Assumed engineering cost of 15% of total field cost
Assumed 10% for contractor overhead and profit
Assumed 10% for construction supervision
Assumed 20% contingency

Project Title: Santa Monica Pier Fire System

Project Location: US

Job No: 4096

Estimate Date: 17DEC07 13:54:24

Prepared By: JAD

Est. Class: Conceptual

Currency: DOLLARS USD



Overall Project Summary - Account Basis

Account	MH	Labor Cost	Matl Cost	Total Cost
(3) Piping	944	49,523	52,085	101,608
(5) Steel	16	697	1,000	1,697
(9) Paint	71	2,876	676	3,553
Direct Totals	1,031	53,097	53,761	106,858
Const Equip & Indirects				6,900
Const Mgt, Staff, Supv				5,310
Freight				2,150
Taxes and Permits				4,570
Engineering				16,029
Other Project Costs				11,907
Contingency				30,745
Indirect Totals				77,611
Project Totals:	1,031	53,097	53,761	184,469



IPM

Project Direct Totals Overall Item Summary

Total direct cost (TDC) summary.
Direct costs presented with key
quantities at an item/commodity level.

Project Title: Santa Monica Pier Fire System
Project Name: 4096 Santa Monica Pier Dry System
Scenario Name: BaseCase
Project Location: US
Estimate Date: 17DEC07 13:34:54

Job No: 4096
Prep. By: JAD



Project Title: Santa Monica Pier Fire System
Project Location: US
Job No: 4096
Estimate Date: 17DEC07 13:34:54

Prepared By: JAD
Est. Class: Conceptual
Currency: DOLLARS USD

Project Direct Totals - Overall Item Summary

Account Code of Account Description	Key Qty	Other Qty	Unit MH	MH	Labor Cost	Unit Mat	Matl Cost	Total Cost	Matl	Weight LBS
(3)AG Pipe										
306 - Piping System Testing										
PIPE TESTING			94.6	94.6	5,161	0.00		5,161		
Code of Account Subtotal				95	5,161			5,161		
311 - CS Field Mat'l										
ELBOW 4 IN STD		16 EACH				26.20	419	419	A 53	151
PIPE 4 IN STD	320 FEET					7.50	2,400	2,400	A 53	3,453
PIPE 6 IN STD	1,600 FEET					12.10	19,360	19,360	A 53	30,359
TEE 6 IN STD		16 EACH				136	2,170	2,170	A 53	515
Code of Account Subtotal							24,350	24,350		34,478
316 - CS Valves: Non-Flanged										
Backflow Preventer		1 ITEM(S)	16.0	16.0	856	2,500	2,500	3,356		
CHEK V 4 IN 150 CLASS		16 EACH				257	4,112	4,112	CS	256
GATE V 4 IN 150 CLASS		16 EACH				275	4,405	4,405	CS	1,710
Code of Account Subtotal				16	856		11,017	11,873		1,966
317 - CS Pipe Erection										
ERECT STRAIGHT RUN PIPE		1,920 FEET	0.18	347.1	17,986	0.00		17,986	A 53	
ERECT VALVES & FITTINGS		64 EACH	1.6	103.8	5,445	0.00		5,445	A 53	
VICTAULIC COUPLING		200 EACH	0.12	23.0	1,251	0.00		1,251	A 53	
Code of Account Subtotal				474	24,683			24,683		
366 - Pipe Hangers, Shoes Etc.										
ERECT PREFAB PIPE SUPP.		139 EACH	2.6	359.4	18,824	73.95	10,279	29,103		520
Code of Account Subtotal				359	18,824		10,279	29,103		520



Project Title: Santa Monica Pier Fire System
Project Location: US
Job No: 4096
Estimate Date: 17DEC07 13:34:54

Prepared By: JAD
Est. Class: Conceptual
Currency: DOLLARS USD

Project Direct Totals - Overall Item Summary

Account Code of Account Description	Key Qty	Other Qty	Unit MH	MH	Labor Cost	Unit Mat	Matl Cost	Total Cost	Matl	Weight LBS
(3) AG Pipe										
368 - Mechanical Connections										
VIC CP 4 IN		96 EACH			22.25	2,136	2,136	2,136	CS	530
VIC CP 6 IN		104 EACH			41.37	4,303	4,303	4,303	CS	1,090
Code of Account Subtotal						6,439	6,439	6,439		1,620
Account Total - (3) AG Pipe	944				49,523	52,085	101,608			38,584
(5) Steel										
523 - Pipe Supports										
Supports	2.0 EACH		8.0	16.0	697	500	1,000	1,697		1,096
Code of Account Subtotal				16	697	1,000	1,697			1,096
Account Total - (5) Steel	16				697	1,000	1,697			1,096
(9) Paint										
912 - Paint - Piping										
1 FINAL COAT BY SPRAY	829 SF		0.03	23.3	942	0.35	294	1,236		
1 PRIMER COAT BY SPRAY	829 SF		0.03	23.3	942	0.43	358	1,300		
Code of Account Subtotal				47	1,885	652	2,536			
922 - Surface Prep - Piping										
COMMERCIAL SAND BLAST		829 SF	0.03	24.9	991	0.03	25	1,016		
Code of Account Subtotal				25	991	25	1,016			
Account Total - (9) Paint	71				2,876	676	3,553			

Project Title: Santa Monica Pier Fire System
Project Location: US
Job No: 4096
Estimate Date: 17DEC07 13:34:54

Prepared By: JAD
Est. Class: Conceptual
Currency: DOLLARS USD



Project Direct Totals - Overall Item Summary

Account Code of Account Description	Key Qty	Other Qty	Unit MH	MH	Labor Cost	Unit Mat	Matl Cost	Total Cost	Matl	Weight LBS
Project Direct Totals				1,031		53,097	53,761	106,858		39,680

UTILITY SYSTEMS

Potable Water System:

It is recommended that the potable water system be repaired and upgraded as follows:

- All water piping that is abandoned and/or no longer in service should be removed back to the nearest point of connection with a live service line and capped at that point, either with a cap, or a valve and a cap if future requirements for a service branch are anticipated in that area.
- Frozen valves, located during inspections, should be replaced or refurbished if fairly new. The most critical valves, such as main isolation valves with frozen actuators, should be scheduled for the earliest replacement. Remaining valves of less importance, such as those serving single users or tenants, can be scheduled for later replacement.
- All missing, improperly installed, heavily corroded, or broken straps, hangers, and supports should be replaced with stainless steel hangers and supports to prevent added stress on adjacent supports and the piping system. Sagging piping should be brought into proper alignment, or replaced if proper alignment is no longer possible. Plastic and metal plumbers tape should be replaced with stainless steel hangers or supports. Hanger/support spacing shall be brought to code standards.
- Label piping mains at ground, exits, and near branches.

The estimated construction cost for repairs and upgrades to the potable water system is approximately \$ 94,700.

Sanitary Sewer, Drain and Vent System:

It is recommended that the sewer, drain and vent system be repaired and upgraded as follows:

- All sewer/drainage/vent piping that is abandoned and/or no longer in service should be removed back to the nearest point of connection with a live service line and capped at that point.
- All missing, improperly installed, or broken supports should be replaced to prevent added stress on adjacent supports and the piping system. Sagging piping should be brought into proper alignment/slope, or replaced if proper alignment is no longer possible. Plastic and metal plumbers tape should be replaced with stainless steel hangers or supports. Hanger/support spacing shall be brought to code standards.
- Along the south side of grid line "a", between pile rows 4 and 7, cut the earthen slope that is deflecting the 6" sewer main to relieve deflection and so water and debris do not build up against the main.
- Flexible hose discharges from area drains near the Aquarium should be realigned to drain to a common area. Consideration should be given to providing a graveled area for the discharge to reduce erosion.
- Storm water downspouts that extend vertically down through the deck from above should be further extended to 12 inches above grade and provided with an elbow and 12 inches minimum of horizontal pipe to direct discharge away from pile foundations and reduce erosion of the soil around the piles.
- Label piping mains at ground, exits, and near branches.

The estimated construction cost for repairs and upgrades to the sanitary sewer, drain and vent system is approximately \$ 59,600.

Natural Gas System:

It is recommended that the natural gas system be repaired and upgraded as follows:

- **Of immediate concern are all the carbon steel hangers and supports for the natural gas system at the outer end of the pier.** Due to heavy corrosion, there numerous hangers that have failed already and imminent failure is likely in many more. These failures pose an increasing danger to the pier and the public if they are allowed to go unattended. All existing carbon steel hangers and supports should be replaced with stainless steel hangers or supports, and supports should be added as necessary. Sagging piping should be brought into proper alignment, or replaced if proper alignment is no longer possible. Hanger/support spacing shall be brought to code standards.
- All natural gas piping that is abandoned and/or no longer in service should be removed back to the nearest point of connection with a live service line and capped at that point.
- Label piping mains at ground, exits, and near branches.

The estimated construction cost for repairs and upgrades to the natural gas system is approximately \$ 40,300.

Electrical and Telephone Systems:

It is recommended that the electrical and telephone systems be repaired and upgraded as follows:

- All conduit supports should be replaced with stainless steel or non-metallic supports.
- Add supports to conform to the National Electric Code requirements
- Remove abandoned conduits and conductors.
- Remove abandoned telephone lines.
- Re-route telephone lines into chases or conduits within a common corridor with laterals to phone connection.

The estimated construction cost for repairs and upgrade to the electrical and telephone systems is approximately \$252,000.

Santa Monica Pier Upgrades
 Upgrade Estimates
 Section Title

JN 5332-02
 September 5, 2008

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	EXTENSION TOTALS
☐ Potable Water System					
1	Removal of non-service lines	1	LS	4,827.00	4,827
2	Refurbish./replacement of 8" valves	1	LS	15,787.00	15,787
3	Hanger/support replacement w/SS	1	LS	33,569.00	33,569
4	Additional new SS hangers/supports	1	LS	10,760.00	10,760
5	Replacement of corroded branch lines	1	LS	14,182.00	14,182
6	Pipe labeling	1	LS	3,235.00	3,235
7					0
8					0
	CONTINGENCY	15%		82,360	12,354
					\$82,360
☐ ☐ TOTAL ESTIMATE					\$94,714
☐ Sanitary Sewer, Drain and Vent System					
1	Removal of non-service lines	1	LS	2,565.00	2,565
2	Regrading earth slope at 6" main	1	LS	270.00	270
3	Relocate flexible hose discharge	1	LS	835.00	835
4	Extend ABS downspouts	1	LS	750.00	750
5	Hanger/support replacement w/SS	1	LS	17,315.00	17,315
6	Additional new SS hangers/supports	1	LS	9,455.00	9,455
7	Replace of CI branch piping with ABS	1	LS	16,090.00	16,090
8	Adding cleanouts	1	LS	3,342.00	3,342
9	Pipe labeling	1	LS	1,185.00	1,185
10					0
	CONTINGENCY	15%		51,807	7,771
					51807
☐ ☐ TOTAL ESTIMATE					\$59,578
☐ Natural Gas System					
17	Removal of non-service lines	1	LS	1,880.00	1,880
18	Hanger/support replacement w/SS	1	LS	25,415.00	25,415
19	Additional new SS hangers/supports	1	LS	7,060.00	7,060
20	Pipe labeling	1	LS	700.00	700
21					0
22					0
23					0
24					0
	CONTINGENCY	15%		35,055	5,258
					35055
☐ ☐ TOTAL ESTIMATE					\$40,313

Santa Monica Pier Upgrades
 Upgrade Estimates
 Electrical System

JN 5332-02
 September 5, 2008

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	EXTENSION TOTALS
□ Replace Conduit Supports					
1	3/4 to 1.5" SS Conduit Straps	3500	EA	5.92	20,720
2	2" SS Conduit Straps	1600	EA	10.95	17,520
3	3" SS Conduit Straps	870	EA	15.00	13,050
4	4" SS Conduit Straps	500	EA	26.10	13,050
5	3/4 to 1.5" SS Conduit Hanger	50	EA	15.78	789
6	2" SS Conduit Hangers	65	EA	23.3	1,514
7	3" SS Conduit hangers	40	EA	34.05	1,362
8	4" SS Conduit Hangers	40	EA	49.09	1,963
9	SS Conduit Rack Assemblies	125	EA	437.86	54,732
10					0
	CONTINGENCY	15%		124,700	18,705
					<u>\$124,700</u>
□ □ TOTAL ESTIMATE					<u><u>\$143,405</u></u>
□ Replace Conduits & Boxes					
9	Replace Damaged Conduits	1	LS	35,617.00	35,617
10	Replace Damaged Boxes	1	LS	37,381.00	37,381
11					0
12					0
13					0
14					0
15					0
16					0
	CONTINGENCY	15%		72,998	10,949
					<u>\$72,998</u>
□ □ TOTAL ESTIMATE					<u><u>\$83,947</u></u>
□ Grounding					
17	Repair Damaged Grounds	1	LS	4,836.00	4,836
18					0
19					0
20					0
21					0
22					0
23					0
24					0
	CONTINGENCY	15%		4,836	725
					<u>\$4,836</u>
□ □ TOTAL ESTIMATE					<u><u>\$5,561</u></u>

LIGHTING STUDY

Introduction

In August of 2007, Moffatt & Nichol was contracted to perform a study of the existing Santa Monica Pier lighting system. The purpose of this study was to observe the current lighting conditions on the Pier and based on the observations, make recommendations for the future Pier lighting system.

The scope of this study also covers strategies to replace the existing Pier lighting system with a new system which will meet the criteria set by the Illuminating Engineering Society of North America (IESNA), the existing Santa Monica Pier Design Guidelines, and the WRT Urban Furnishings design theme in order to provide pleasing illumination levels as well as required security illumination levels throughout the Pier facilities.

This study also makes recommendations to address installation costs, energy efficiency, night-sky pollution, durability and maintenance of light standards, and style of light standards, making certain they will be consistent with the overall character of the Pier and Pier functions.

Existing Lighting Conditions

There are a number of styles and types of lighting systems present on the Pier today. The majority of these are pole mounted decorative non-cutoff metal halide or cobra head roadway style light fixtures. According to the Urban Furnishings Assessment Report approximately 20% of the fixtures were non-operational at the time of the survey.

Foot candle measurements of the existing Pier lighting system were taken on 1/10/08 using a Minolta T-1 illuminance meter with 5 meter extension cable. There was no moonlight contribution and the sky was clear. Horizontal measurements were taken at ground level on a diagonal grid across the entire Pier deck (excluding the Amusement Park). A number of light fixtures were inoperable on the evening that the measurements were taken. These points were eliminated from the average readings in order to achieve a more accurate depiction of the actual foot candle levels.

The following are the average foot candle readings at each area of the Pier. We have also noted the fixture type and lamp source for each area:

Municipal Pier from entrance ramp to end of Amusement Area:

Lighting fixtures in this area are identified as Type 1 in the WRT Urban Furnishings Assessment Report. The fixtures are semi cut-off cobra head style with metal halide lamps, mounted on 18' steel poles with mast arms, and spaced approximately 80 feet on center.

The average measurement in this area is 2.76 foot candles

Newcomb Pier West and South Side of Amusement Area:

Lighting fixtures in this area are identified as Type 2 in the WRT Urban Furnishings Assessment Report. The fixtures are ornamental teardrop historic style with metal halide lamps, mounted on 15' decorative cast poles, spaced approximately 40 feet on center.

The average measurement in this area is 1.05 foot candles

Municipal Pier from end of Amusement Area to beginning of Observation Deck:

Lighting fixtures in this area are identified as Type 2 in the WRT Urban Furnishings Assessment Report. The fixtures are ornamental teardrop historic style with metal halide lamps, mounted on 15' decorative cast poles, spaced approximately 40 feet on center. Three additional poles are located at the fishing platforms on the North and South sides of the pier..

The average measurement in this area is 1.81 foot candles

The average measurement on the fishing platforms is .52 foot candles

Municipal Pier Observation Deck Area:

Lighting fixtures in this area are identified as Type 2 in the WRT Urban Furnishings Assessment Report. The fixtures are ornamental teardrop historic style with metal halide lamps, mounted on 15' decorative cast poles, spaced approximately 40 feet on center.

The average measurement in this area is 1.34 foot candles.

Municipal Pier Fishing Platforms:

Lighting fixtures in this area are identified as Type 3 in the WRT Urban Furnishings Assessment Report. The fixtures are shoe-box style floodlights with a combination of metal halide and high pressure sodium lamps, mounted on 15' 8x8 wooden poles. The platforms also receive lighting contribution from the adjacent Observation Deck light fixtures.

The average measurement in this area is 2.88 foot candles

Newcomb Pier Parking Area:

Lighting fixtures in this area are identified as Type 4 in the WRT Urban Furnishings Assessment Report. The fixtures are shoe-box style metal halide floodlights, mounted on 20' 8x8 wooden poles. The parking area also receives lighting contribution from similar building mounted floodlight fixtures. This type of fixture produces a great deal of glare, further obstructing visibility in the darkened portions of the parking area.

The average overall measurement in this area is 1.87 foot candles, however the perimeter areas are much brighter, at 2.49 foot candles, than the center rows, measuring an average of .75 foot candles

Newcomb Pier East of the Hippodrome:

Lighting fixtures in this area are identified as Type 5 in the WRT Urban Furnishings Assessment Report. The fixtures are ornamental porcelain reflector historic style with metal halide lamps, mounted on 15' decorative metal poles, randomly spaced at edge of Pier deck. Most of the lighting in this area was inoperable on the evening that the measurements were taken. Measurements were taken in the area surrounding an operable twin fixture pole and used to determine an average for the remaining area.

Assuming all fixtures in working order the estimated average measurement in this area is approximately 2.29 foot candles

Bike Path Tunnel Below Pier Deck:

Lighting fixtures in this area metal halide wall pack style fixtures mounted with staggered spacing on opposite sides of the Bike Path.

The average measurement in this area is 2.0 foot candles

Access Stairs at South Side of Pier:

Lighting fixtures in this area are similar to Type 3 in the WRT Urban Furnishings Assessment Report. The fixtures are shoe-box style metal halide floodlights, mounted on 8x8 wooden poles. The lighting was inoperable on the evening that the measurements were taken.

The average measurement from contribution of the Parking Area lights is 0.8 foot candles on both the East and West stairs.

Access Stairs at North Side of Pier:

Lighting fixtures in this area are similar to Type 3 in the WRT Urban

Furnishings Assessment Report. The fixture is a single shoe-box style metal halide floodlight, mounted on 8x8 wooden pole.

The average measurement on the stairs is 0.8 foot candles

Access Stairs at South Side Bleachers:

Lighting fixtures in this area are similar to Type 3 in the WRT Urban Furnishings Assessment Report. The fixtures are shoe-box style metal halide floodlights, mounted on 8x8 wooden poles.

The average measurement on the stairs is 2.0 foot candles on the East stairs and 9.2 foot candles on the West stairs. The higher foot candle level on the West stairs is due to contribution from the volleyball court lighting. "Insert foot-candle measurements"

The measured lighting levels are generally less than the recommended levels of the IESNA and the existing Pier Development Guidelines.

Lighting Design Considerations

The proposed lighting systems should create a nighttime environment conducive to safe and comfortable vision for the users on the pier. These factors, when attained, combine to improve traffic safety and flow, pedestrian safety, and promote enjoyable use of the Pier facilities during the evening and nighttime hours. When these applications for illumination are achieved, the increased visibility on the Pier can provide economic and social benefits, which include:

- Public safety
- Efficient traffic flow
- Nighttime social events

Choice of Light Source:

After meeting with the City it was determined that the preferred lighting source would be metal halide. Metal halide is whiter in color than most high intensity discharge lamps and has a very high color rendering index which makes it an appropriate choice for illumination of Pier signage, banners and building facades. Newer pulse-start lamps are recommended for longer lamp life and color rendering. LED Technology would also be appropriate for accent lighting.

Light Pollution:

Misdirected or misapplied outdoor lighting can lead to light pollution. Light pollution is the term used to describe sky brightness caused by scattering of light in the atmosphere. It is recommended to use fixtures with a cut-off or semi-cutoff design or to use shields or fixture hoods where appropriate in order to reduce light pollution and uncomfortable glare to the surrounding community while still meeting the desired illumination requirements for vehicle and pedestrian safety.

Decorative Pole and Fixture Selection:

It is recommended that the theme for the Pier lighting system would be consistent with the present decorative cast pole and tear drop light fixture, similar to those found at the end of the Newcomb Pier. Within that theme this study will review three alternative poles with luminaries. These are attached in the section “Lighting Alternatives”. There are a wide variety of options available with all three types. These include custom color and finish, pole tops (finials), pole base, banner arms, street signs, power outlets, etc.

Maintenance:

In meeting with the City, some concerns were brought up in addition to normal routine maintenance of a lighting system. One is that the ballast for the light fixtures be mounted in the pole base for ease of maintenance and replacement. From past experience, problems have incurred with the present lighting fixtures with fixture-mounted ballasts. Also it was requested that the lenses or globes be provided with a captive hinge or cable so that when removed for maintenance the lens or globe would be held in place leaving the maintenance personnel with both hands free to make necessary repairs. Another concern was the pole material and finish. Poles and fixtures are subject to a severe marine environment. Materials used must be appropriate for these conditions.

Lighting Levels:

The lighting level requirements in this study are based upon the recommendations of the Illuminating Engineering Society of North America (IESNA) Handbook.

The average maintained illumination levels for outdoor Parks, Plazas and Pedestrian Malls is approximately 5 foot candles.

The average maintained illumination level for Outdoor Parking Areas is approximately 1 to 2 foot candles for pedestrian safety and security lighting.

Higher levels can be achieved for areas around vendor carts and booths, and at individual buildings where desired, by adding supplemental down lights to poles or wall mounted lights to building structures.

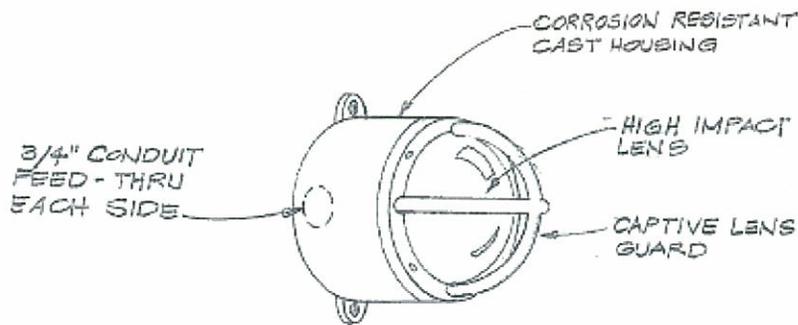
Decorations and Attachments:

Each of the Alternative Lighting selections are capable of being outfitted with banners, signage, hooks, decorative post tops, and with special outlets for connection of holiday decorations or for vendor usage. In addition, the Holophane “Site Link” product has the added capability of attaching security, sound and other data system components with no exposed conduits or wiring.

Pier Necklace Lighting:

The existing Pier necklace lighting system is not operational and should be removed or replaced. It was recommended that the system be replaced with a custom vandal resistant LED fixture. See Figure 13. The estimated construction cost for this system is \$442,000. In meeting with the City it was determined that a proposed hard-wired marine grade LED system exceeds the budget for the Necklace Light system. It was suggested that an alternative might be a deck mounted solar powered LED fixture system. After further review of available fixtures and systems it appears that solar powered fixtures may not be an acceptable alternative for both operational reliability and maintenance reasons.

A less permanent but lower cost alternative was also suggested. This alternative utilizes LED Rope Lights. For this alternative, the basic electrical distribution is still required, but the rope lights are used instead of the vandal resistant fixtures. Sufficient rope lights to cover the perimeter would cost approximately \$12,500 compared to \$300,000 for the vandal resistant fixtures. Therefore, the estimated construction cost for the rope light alternative is approximately \$ 125,950. Since the LED lights are one inch apart in the rope the effect will look like a continuous light around the pier. However, because of the large quantity require it is possible to have a special configuration with the LED at a greater spacing.



**SANTA MONICA PIER
NECKLACE LIGHT FIXTURE**

Approximately 750 fixtures at 5'- 0" O.C. to outline Pier Structure.

Custom LED vandal resistant marine grade fixture with cast housing, and high impact lens and captive gasketed cast lens guard.
Manufactured by Cole Lighting, El Monte California

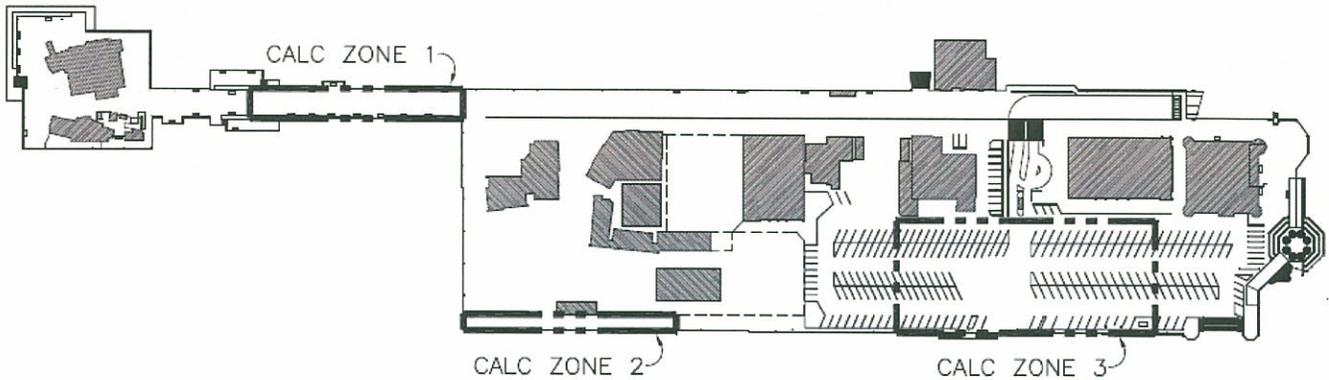
Figure 13

Sample Foot Candle Calculations

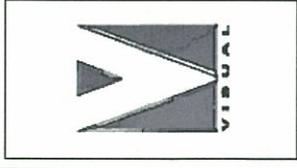
The following pages show the approximate foot candle levels and pole spacing using the style of poles and fixtures recommended by the WRT Urban Furnishings report for the Main Pier, along the outer walkway of the Amusement Area, and for the Parking Lot Area.

Sample Area Calculations:

- Calculation Zone #1 – Main Pier
- Calculation Zone #2 – Amusement Area
- Calculation Zone #3 – Parking Lot Area



① LIGHTING CALCULATION ZONES – KEY MAP

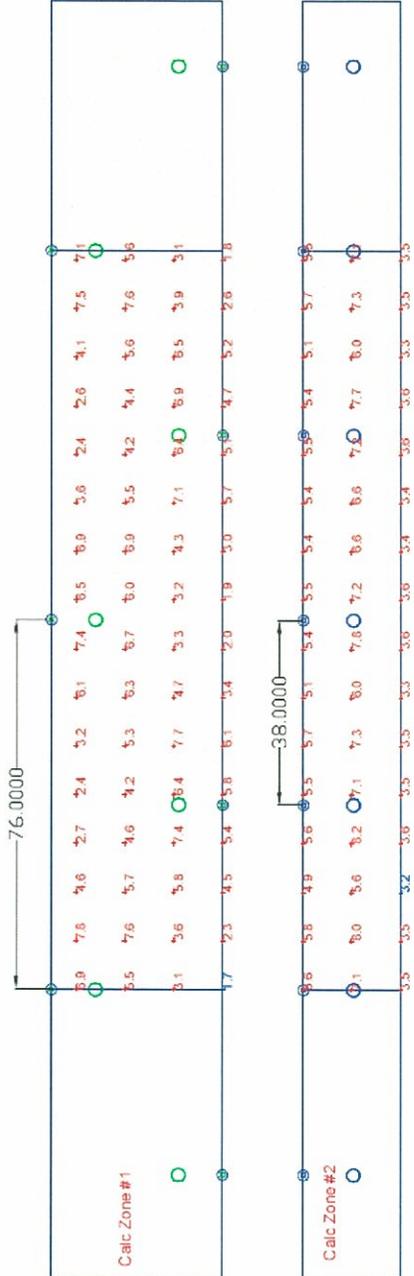


Designer _____
 Date Aug 29 2008
 Scale _____
 Drawing No. _____
 1 of 1

STATISTICS						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Calc Zone #1	+	5.0 fc	7.8 fc	1.7 fc	4.6:1	2.9:1
Calc Zone #2	+	5.3 fc	8.2 fc	3.2 fc	2.6:1	1.7:1

LUMINAIRE SCHEDULE

Symbol	Label	Qty	Catalog Number	Description	Lamp	File	Lumens	LLF	Watts
○	B	7	ESP175MH00X4	ESPLANADE PEDESTRIAN	175W COATED MH	48838.IES	13200	1.00	175
○	D	7	ESP17DMH00X4	ESPLANADE PEDESTRIAN	175W COATED MH	48794.IES	15000	1.00	175

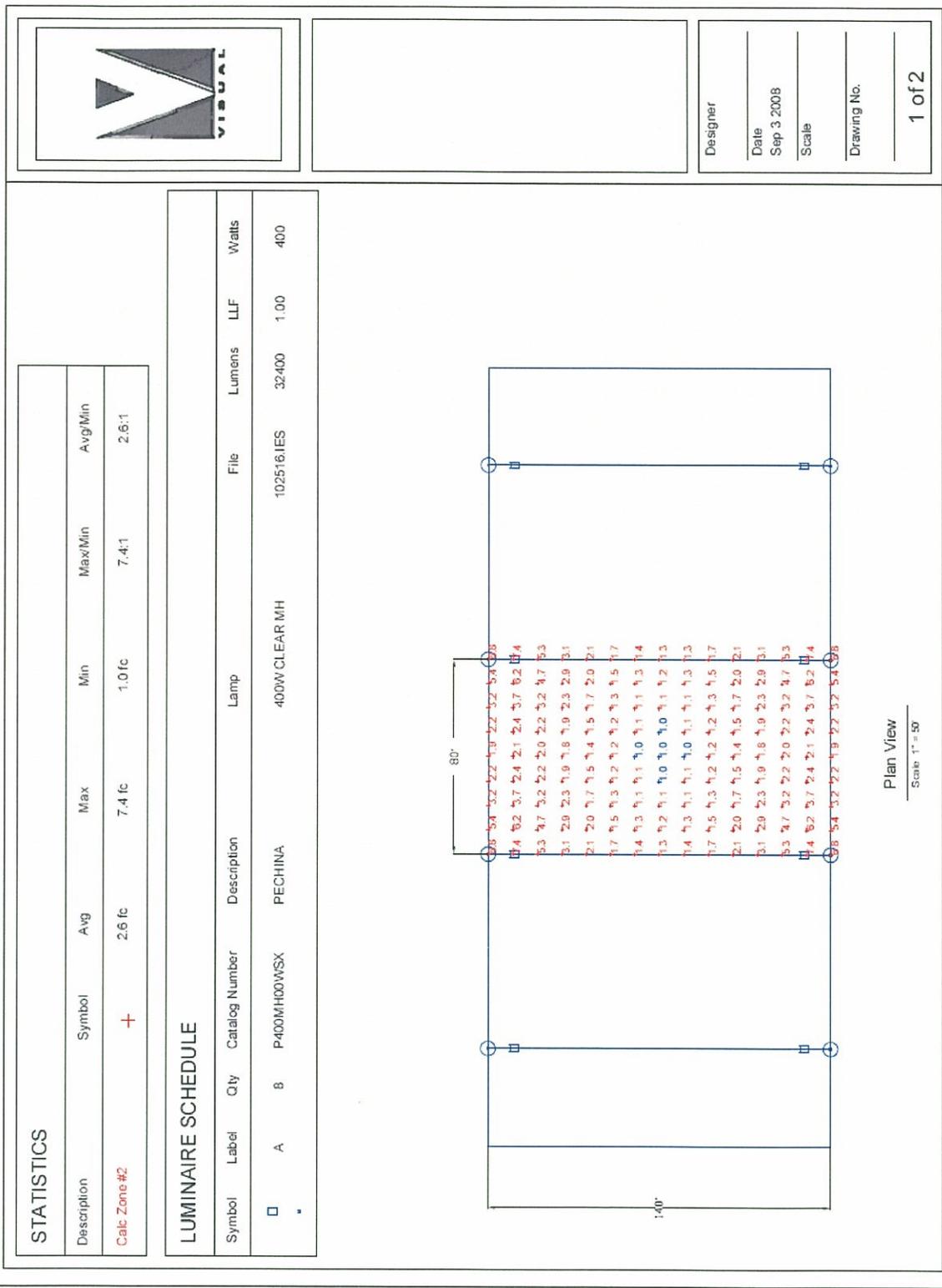


38' SPACING / 12' MOUNTING HEIGHT

Plan View
 Scale: 1" = 30'

Calculation Zones #1 and #2

Figure 14



Calculation Zones #3

Figure 15

Lighting Alternatives

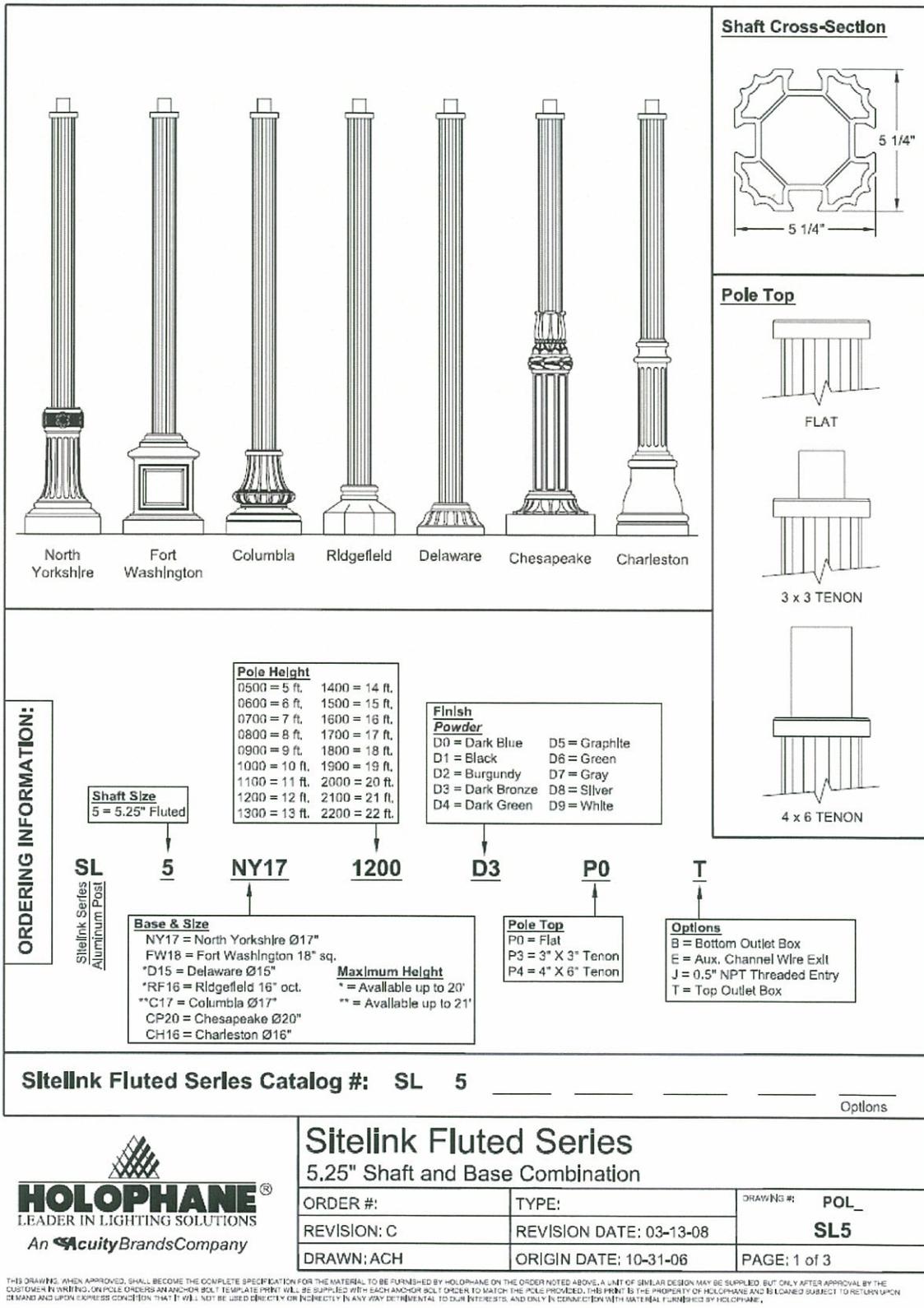
Option 1 is a Holophane Site Link pole which is made of extruded aluminum and has a Kynar /Hylar finish for waterfront applications. The pole is available with a number of accessories and mounting base styles. The pole is of modular construction which allows attachment of accessories to an integral track mounting system. It also has separate internal raceways for power and data/communication cables so that no surface mounted raceways are required to feed attached security or sound equipment.

Option 2 is an Ameron concrete pole which is made of precast concrete with exposed aggregate and a marine grade sealant also for waterfront applications. The pole is available in custom colors to match the Pier surroundings. Accessories are attached by brackets available from the manufacturer. Internal flexible raceways and pre-installed openings are required in order to feed attached security and sound equipment. The pole does extremely well in a marine environment.

Option 3 is a Spring City Cast Iron pole with a marine grade finish. The Pole is available in custom colors to match the Pier surroundings. The pole is more prone to corrosion than Options 1 and Option 2. Accessories are attached by brackets available from the manufacturer. Internal flexible raceways and pre-installed openings are required to feed attached security and sound equipment.

Parking lot lighting

Parking lot lighting would have similar poles to match the Main Pier and Amusement Areas. The fixtures however would be mounted at approximately 25' and utilize cutoff type fixtures to help prevent glare and stray light into the surrounding areas. The fixtures would be 250 to 400 watt metal halide to match the color of the adjacent Pier lighting. Where light poles are not feasible due to location of taller buildings, fixtures can be bracketed and mounted on the top of the building structure.

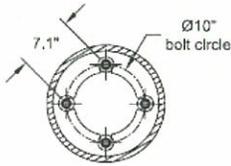
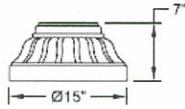


LIGHTING OPTION # 1 – ALUMINUM POLE

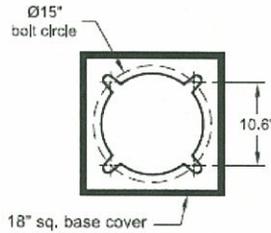
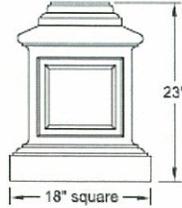
Figure 16

Base and Anchorage Guide

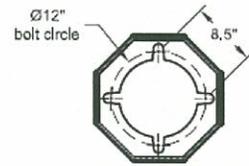
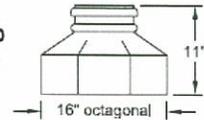
Delaware



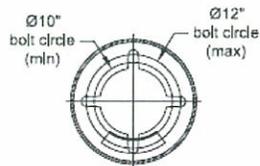
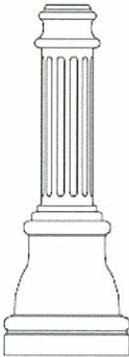
Fort Washington



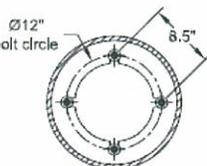
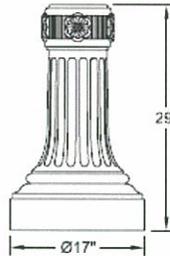
Ridgefield



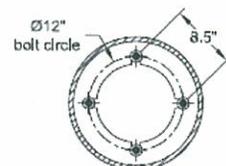
Charleston



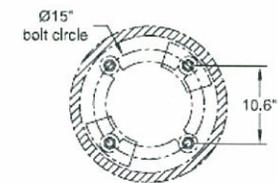
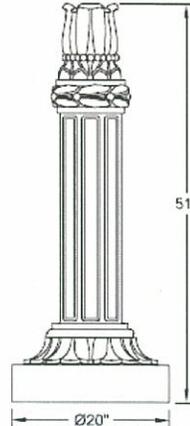
North Yorkshire



Columbia



Chesapeake



Sitelink Fluted Series
5.25" Shaft and Base Combination

ORDER #:	TYPE:	DRAWING #:	POL_
REVISION: C	REVISION DATE: 03-13-08		SL5
DRAWN: ACH	ORIGIN DATE: 10-31-06	PAGE:	2

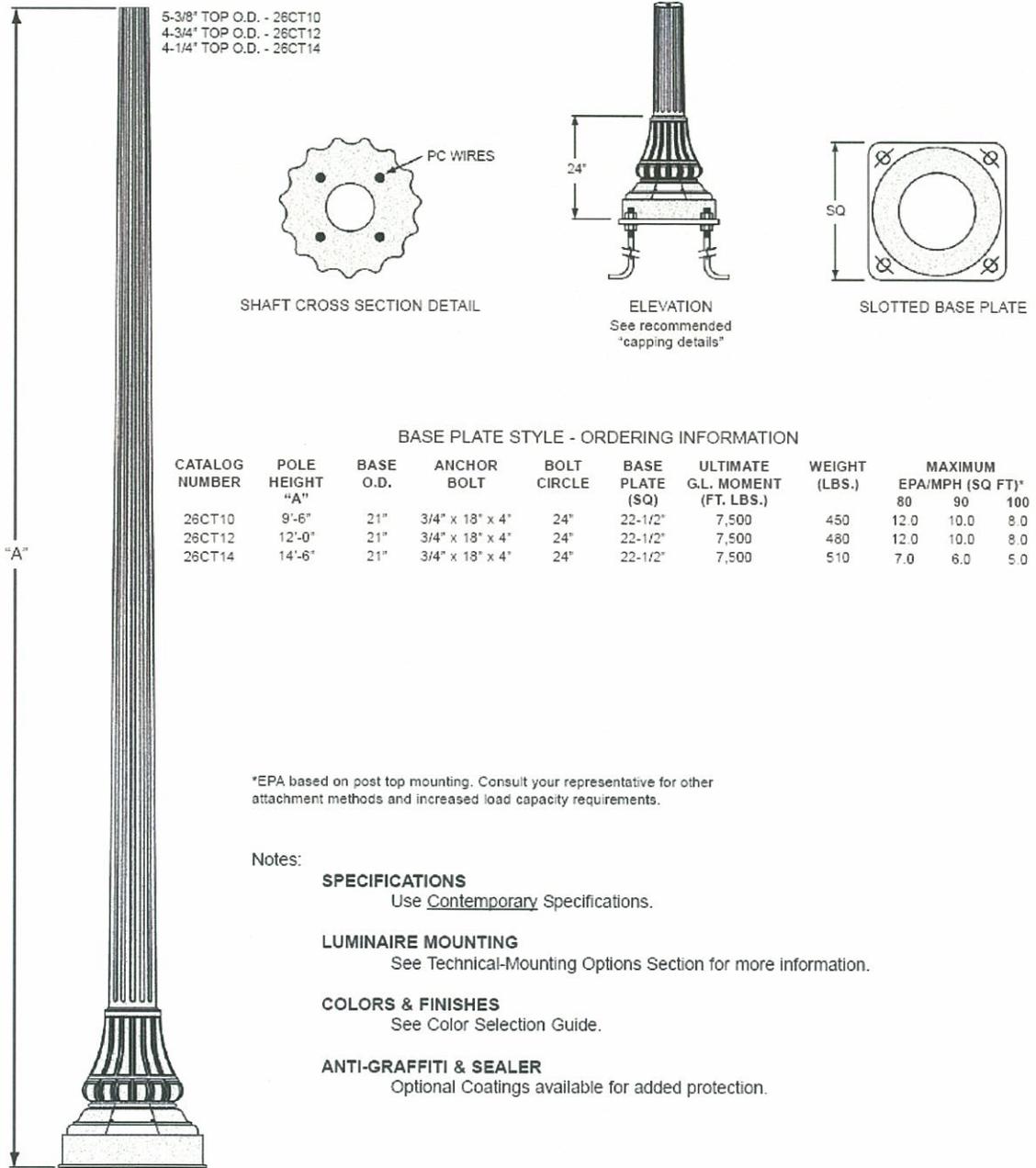
THIS DRAWING, WHEN APPROVED, SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE. A UNIT OF SIMILAR DESIGN MAY BE SUPPLIED, BUT ONLY AFTER APPROVAL BY THE CUSTOMER. IN WRITING. ON POLE ORDERS AN ANCHOR BOLT TEMPLATE PRINT WILL BE SUPPLIED WITH EACH ANCHOR BOLT ORDER TO MATCH THE POLE PROVIDED. THIS PRINT IS THE PROPERTY OF HOLOPHANE AND IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON EXPRESS CONCERN THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO OUR INTERESTS, AND ONLY IN CONNECTION WITH MATERIAL FURNISHED BY HOLOPHANE.

LIGHTING OPTION # 1 (Continued)

Figure 17

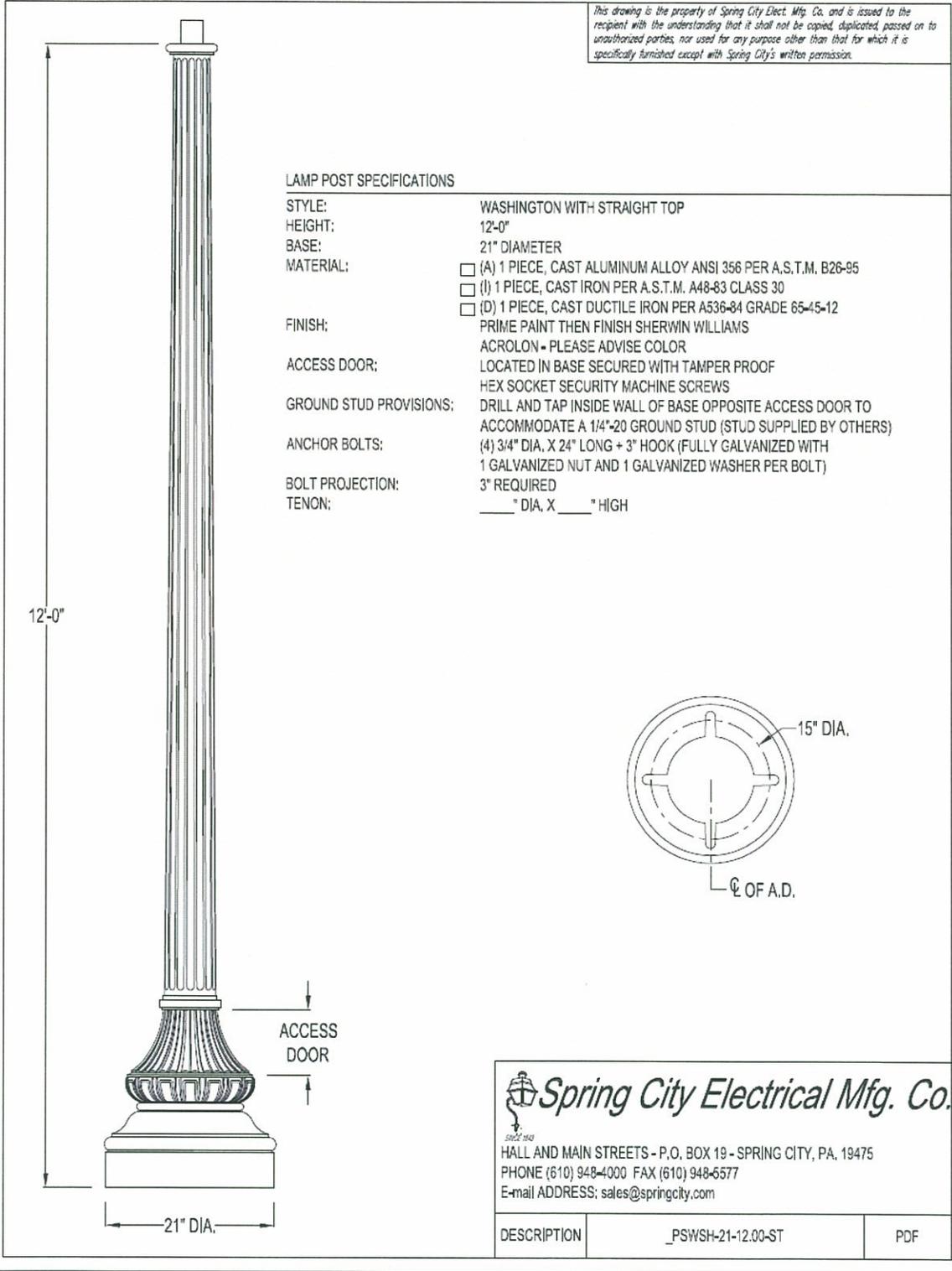


Traditional Series
Washington Pole



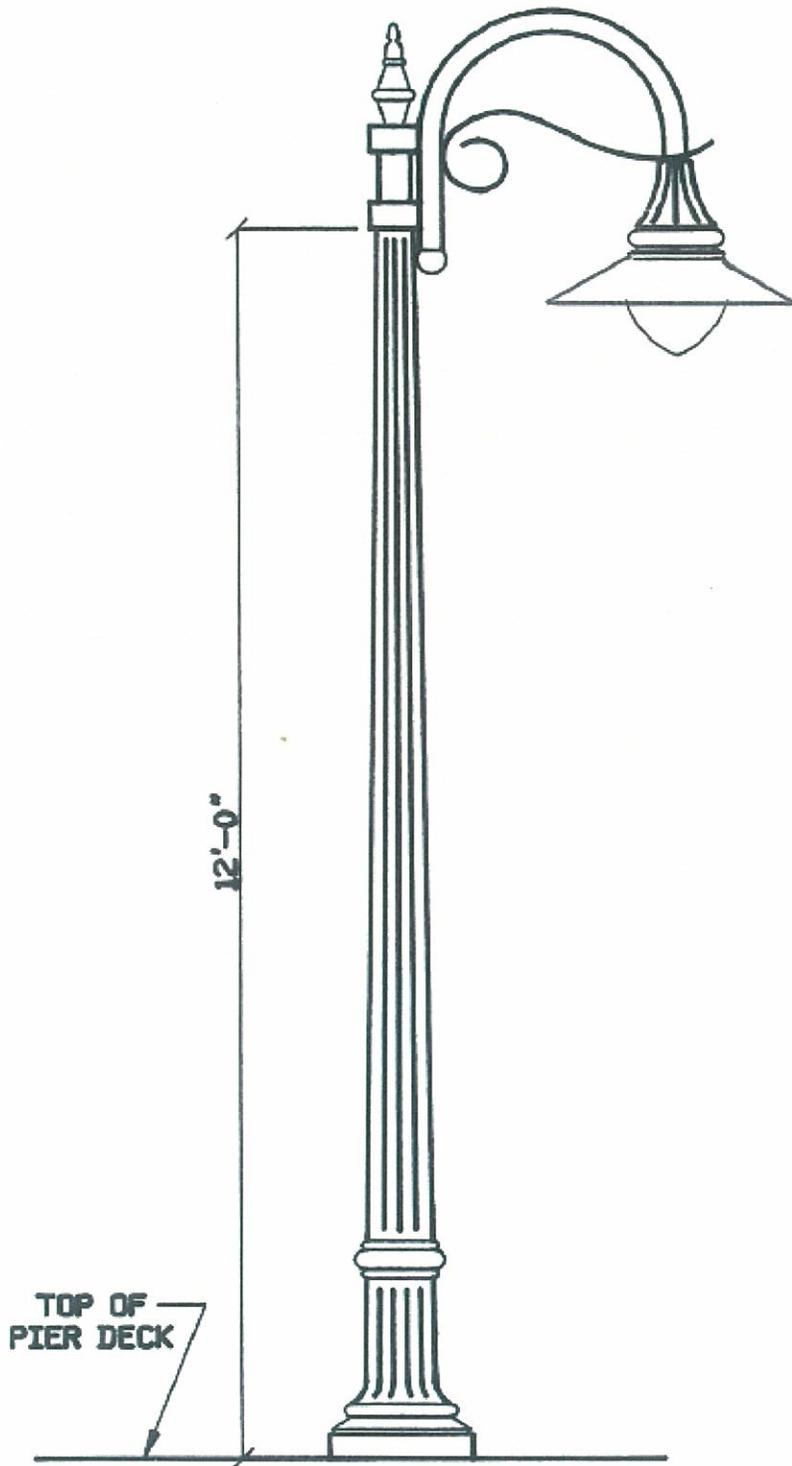
LIGHTING OPTION # 2 – CONCRETE POLE

Figure 18



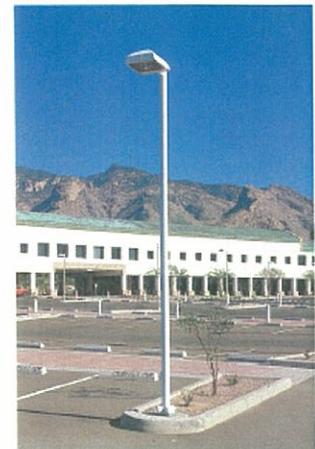
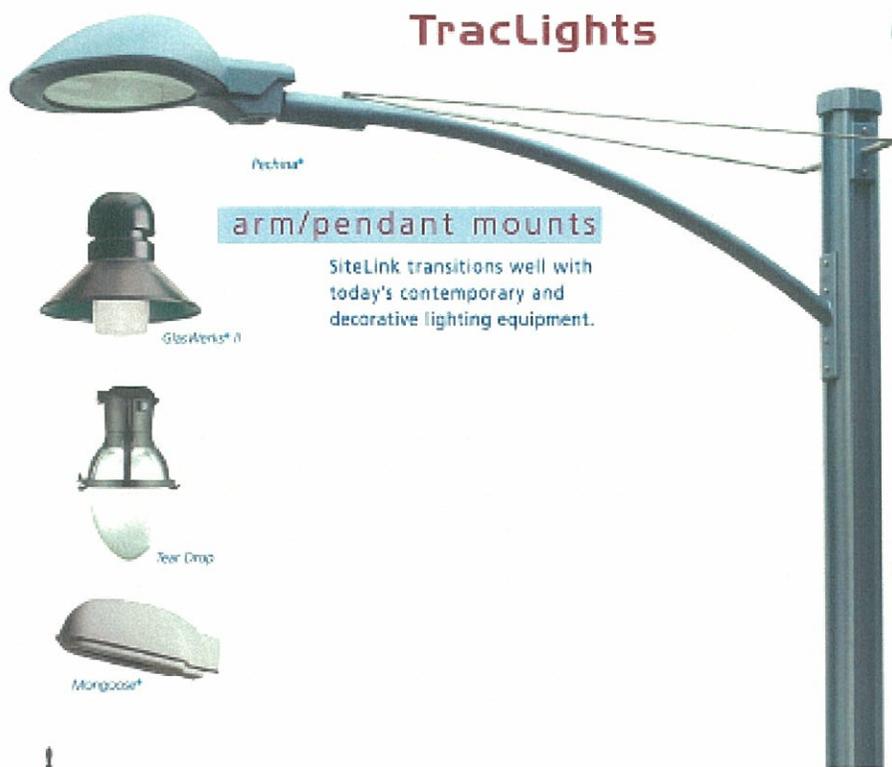
LIGHTING OPTION # 3 – CAST IRON POLE

Figure 19

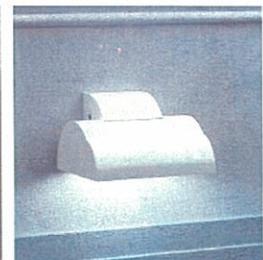
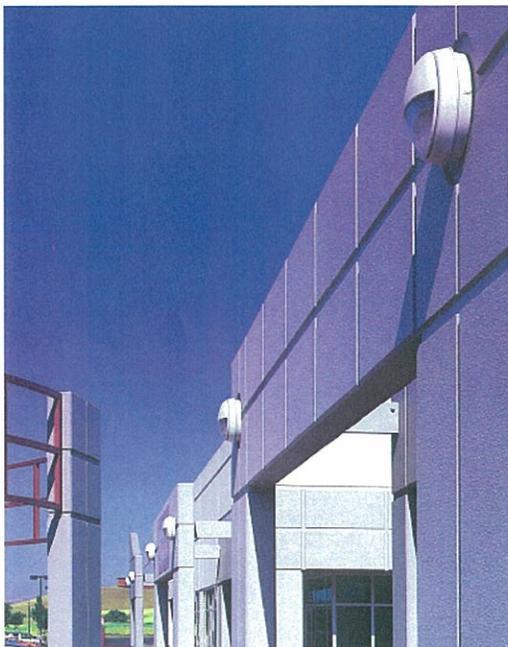


PIER AREA LUMINAIRE REPRESENTATION

Figure 20



Example – Cutoff Type Fixtures



Example – Wall Mount Fixtures

Santa Monica Pier Upgrades
 Upgrade Estimates
 Lighting

JN 5332-02
 November 17, 2008

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	EXTENSION TOTALS
☐ NECKLACE LIGHTS Vandal Resistant Fixtures					
1	3/4" PVC Conduit	3800	LF	6.84	26,000
2	3/4" Threaded Male Adapters	1500	EA	16.67	25,000
3	#8 Copper Conductor	16000	LF	1.13	18,000
4	LED Marine Fixture w/Box	750	EA	400.00	300,000
5	Controls & Panel	1	LS	3,000	3,000
6	Remove Existing	1	LS	30,000	30,000
7					0
	CONTINGENCY	10%		402,000	40,200
					<u>\$402,000</u>
☐☐ TOTAL ESTIMATE					\$442,200
☐ NECKLACE LIGHTS LED Rope Lights					
1	Electrical Supply System	1	LS	102,000	102,000
2	LED Rope Lights	3750	LF	3.33	12,500
7					0
	CONTINGENCY	10%		114,500	11,450
					<u>\$114,500</u>
☐☐ TOTAL ESTIMATE					\$125,950
☐ Light Poles and Fixtures - SiteLink Aluminum					
1	15' Pole and Fixture	83	EA	13,000.00	1,079,000
2	Wall Mounted Fixture	15	EA	1,600.00	24,000
3	25' Parking Pole and Fixture	18	EA	13,200.00	237,600
4					0
	CONTINGENCY	15%		1,340,600	201,090
					<u>1340600</u>
☐☐ Total Light Poles and Fixtures					\$1,541,690
☐ Light Poles and Fixtures - Ameron Concrete					
1	15' Pole and Fixture	83	EA	7,050.00	585,150
2	Wall Mounted Fixture	15	EA	1,600.00	24,000
3	25' Parking Pole and Fixture	18	EA	9,850.00	173,700
4					0
	CONTINGENCY	15%		782,650	117,427
					<u>782650</u>
☐☐ Total Light Poles and Fixtures					\$900,277
☐ Light Poles and Fixtures - Spring City Cast Iron					
1	15' Pole and Fixture	83	EA	6,000.00	498,000
2	Wall Mounted Fixture	15	EA	1,600.00	24,000
3	25' Parking Pole and Fixture	18	EA	8,050.00	144,900
4					0
	CONTINGENCY	15%		666,900	100,035
					<u>666900</u>
☐☐ Total Light Poles and Fixtures					\$766,935
☐ Lighting Power Distribution					
1	3/4" Rigid Conduit	500	LF	9.50	4,750
2	1" PVC Conduit	15,000	LF	6.65	99,750
3	2" PVC Conduit	400	LF	10.50	4,200
4	1" T Fitting & Cover	250	EA	65.00	16,250
5	#8 CU Conductor	80,000	LF	1.13	90,400
6	#8 CU Conductor	1,000	LF	1.52	1,520
7	#1/0 CU Conductor	4,000	LF	4.20	16,800
8	Ground Rod	2	EA	159.00	318
9	Core Drill	30	EA	39.00	1,170
10	Lighting Panel & Controls	4	EA	4,000	16,000
11	Photocell Control	2	EA	84	168
12	S.S. Straps	3,000	EA	5.6	16,800
13					0
	CONTINGENCY	15%		266,126	40,218
					<u>266126</u>
☐☐ Total Lighting Power Distribution					\$306,344

**Santa Monica Pier Infrastructure Assessment Study
10 Year Capital Improvement Plan**

The matrix on the next page presents the proposed distribution, over a ten year period, of the upgrades recommended in the Upgrade Studies and the Recommendations for Urban Design Elements reports for the Santa Monica Pier Infrastructure Assessment Study.

The upgrade shown in the early years are based on structural or operational urgency as compared to the other items listed for later years. Upgrade of Newcomb Pier Area 17 under the Pacific Park buildings is included in years nine and ten in order to show the total cost in the program, even though the actual time frame depends on future events.

Santa Monica Pier Infrastructure Assessment Study
10 Year Improvement Plan

Facility	Costs	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Structural Upgrades												
Newcomb Pier												
Area 1	\$133,000						\$133,000					\$133,000
Area 2	\$1,506,000	\$1,506,000										\$1,506,000
Area 3	\$330,800			\$330,800								\$330,800
Area 4	\$720,000	\$720,000										\$720,000
Area 5												\$0
Area 7	\$174,000	\$174,000										\$174,000
Area 8	\$153,000								\$153,000			\$153,000
Area 10	\$2,052,000			\$2,052,000								\$2,052,000
Area 11												\$0
Area 12	\$628,000				\$628,000							\$628,000
Area 14	\$1,200,000						\$1,200,000					\$1,200,000
Area 15	\$210,000				\$210,000							\$210,000
Area 16	\$385,000				\$385,000							\$385,000
Area 17	\$5,000,000									\$2,500,000		\$5,000,000
Aquarium Roof	\$330,000							\$330,000				\$330,000
Municipal Pier												
Phase 4	\$4,800,000		\$4,800,000									\$4,800,000
Waffle Slab	\$3,800,000					\$3,800,000						\$3,800,000
Safety Upgrades												
Evacuation Facility	\$800,000	\$800,000										\$800,000
Fire Line Sectionalizing Valve	\$25,000	\$25,000										\$25,000
Dry Standpipe System	\$165,000	\$165,000										\$165,000
Utilities												
Portable Water	\$94,700	\$94,700										\$94,700
Sewer, Drain & Vent	\$59,600	\$59,600										\$59,600
Natural Gas	\$40,300	\$40,300										\$40,300
Electrical	\$252,000	\$252,000										\$252,000
Lighting												
Necklace Lights	\$422,000							\$211,000	\$211,000			\$422,000
Perimeter Lights	\$1,489,000	\$125,992	\$274,892	\$114,538	\$194,715		\$160,354	\$148,900	\$160,354	\$148,900	\$160,354	\$1,489,000
Parking Deck Lights	\$328,000	\$164,000		\$164,000								\$328,000
Service Area Lights	\$33,000				\$33,000							\$33,000
Urban Design												
Carousel Onion Dome	\$50,000	\$50,000										\$50,000
Benches	\$158,370						\$158,370					\$158,370
Bollards	\$184,700						\$184,700					\$184,700
Tables	\$13,300						\$13,300					\$13,300
Seat Wall	\$46,800			\$46,800								\$46,800
Repair & Modify Railing	\$671,000			\$671,000								\$671,000
Trash Receptacles	\$53,200						\$53,200					\$53,200
Bike Racks	\$4,200						\$4,200					\$4,200
Total Improvement Costs	\$26,531,970	\$4,196,592	\$5,074,892	\$3,048,338	\$1,981,515	\$3,800,000	\$1,907,124	\$689,900	\$524,354	\$2,648,900	\$2,660,354	\$26,531,970



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