AMENDMENT 005

Asset Management Plan
WMATA Parking Garages
Volume 2 of 3
February 2015
Walker Restoration Consultants

DISCLOSURE STATEMENT:

All data and information provided on this report is for <u>informational purposes only</u> as it may report conditions using standards greater than industry standards.

Washington Metropolitan Area Transit Authority (WMATA) makes no representations as to accuracy, completeness, currentness, suitability, or validity of any information contained within this report and will not be liable for any errors, omissions, or obsolescence in this information or any losses, injuries, or damages arising from its content or use. All information is provided on an as-is basis.

Proposers shall ensure their proposal submission details the standards that will be used for maintenance and capital repairs of the facilities. The proposer's maintenance standards shall ensure all parking assets are returned to WMATA at the conclusion of the Concession Agreement with no less than either 10 years remaining usable life or the same remaining usable life of the asset at the outset of the agreement, whichever is less.

PROJECT NO. 14-3944.04

ASSET MANAGEMENT PLAN

WASHINGTON AREA METROPOLITAN TRANSIT AUTHORITY PARKING GARAGES

Prepared for:
Metro

FEBRUARY, 2015
VOLUME 2 OF 3

TABLE OF CONTENTS

VOLUME 3

HUNTINGTON 3

WALKER
RESTORATION CONSULTANTS

FEBRUARY 2015 14-3944.04

The summary data for the facility is as follows:

Table HUNT3-1: Facility Information Summary

	HUNTINGTON 3
Location:	2501 Huntington Ave Alexandria, VA 22303
Overall Condition:	**GOOD**
Current Needs:	**MINOR**
Chloride Contamination	**MINOR**
Year built:	2008
Supported Levels	5
Levels Below Grade	None
Parking Space Capacity:	1,451
Parking Efficiency:	299 SF/Space
Footprint:	Approximately 434' x 240'
Bridges:	1 Pedestrian, 1 Vehicular
Vehicle Circulation:	Double Helix
Pedestrian Circulation	3 Stair(s), 2 Elevator(s)
Parking Area: Slab on Grade Total Supported Area Total Parking Area	 74,000 ± SF 364,000 ± SF 438,000 ± SF
Structural System	Precast Un-topped Double Tee
Façade Spandrel Treatment	Precast

FACILITY DESCRIPTION

NORTH VIEW

SOUTH VIEW

EAST VIEW

WEST VIEW

PLAN VIEW

FEBRUARY 2015 14-3944.04

EXECUTIVE SUMMARY

This 2008 garage is in good shape, has minor chloride contamination and has minor current repair needs

Its scheduled repairs are anticipated to cost:

2020 – Near Term - $277,996
2022 – Long-term - $594,771

See Appendix A for cost details.

CRITICAL REPAIRS

The following safety related items requiring urgent action were identified in our two 3/26/2014 emails to Metro:

1. Overhead spalls on columns
2. Stair and landing tread spalls

Please see the above reference emails, found in Appendix E, for more detail and recommended actions. We have no further immediate concerns.

NEAR-TERM REPAIRS

Due to the age and condition of the garage we recommend most of the non-critical repairs be completed in 2020, year five of the master repair plan. These near-term repairs include addressing the structural items found including:

1. Remove and replace spalled overhead concrete found on bridges and columns with repair concrete anchored with supplementary embedded steel pins. Monitor this condition at least every 6 months until replacement and remove loose concrete.
2. Remove and replace stair tread and landing spalled concrete with repair concrete.
3. Repair stair railing anchor points
4. Remove and replace concrete floor slab cracks and spalls on the south entrance bridge
5. Replace roof level floor sealants

Based on chloride test results, we do not recommend any improvements to protect the floor structural system.

RECOMMENDATIONS

LONG-TERM REPAIRS

Long term repairs include a second round of structural and waterproofing repairs in 2022, two years after the near-term repairs to address continued deterioration of the concrete and the end of the useful life of the waterproofing products. Long-term repairs items include the following:

1. Replace interior level floor sealants
2. Replace façade joint sealants
3. Replace roof level expansion joint glands
4. Repaint traffic markings
5. Repaint curbs

CONDITION ASSESSMENT

OBSERVATIONS AND DISCUSSION

The following observations were made during a facility walk through on the March 24 to 26, 2014 site visit. Photographs referenced within the observations are found in Appendix B of the report. Observations are immediately followed by a brief discussion of the repair in italics.

1. Roof level floor sealants are in fair condition and require replacement within 5 years. (Photo 16, 17, 18)
2. Interior floor sealants are in fair condition and require replacement within 10 years.
3. Roof level expansion joints are in good condition and require replacement within 10 years.
4. Interior level expansion joints are in good condition and require replacement within 10 years.
5. Stair treads and landings were observed to have spalls which require repair now to eliminate trip hazards. (Photo 11, 12)
6. The south vehicular bridge double tee soffits were observed to have extensive leaching cracks and moderate effloresence which require structural repair and waterproofing to address deterioration (Photo 1, 2, 3, 4, 5)
7. Two handicap spaces have wheel stops in lieu of bollards as the means for resisting vehicular impact load and require bollard installation. (Photo 6)
8. A column was observed to be cracked/spalled which requires structural repair. (Photo 8, 9)
9. The exterior stair handrail posts at the north end of the

garage are damaged and require repair now. (Photo 13, 14, 15)

10. Many pendant mounted lights at the north entrance have fallen the large distance to grade and as these will be replaced shortly, need to have modified anchoring to properly support the lights. (Photo 10)
11. A minor amount of localized ponding was observed and new supplemental drains need to be installed. (Photo 16, 17, 18)

MATERIAL TESTING

Concrete powder samples were extracted from floor surfaces of the roof and intermediate supported levels of the parking garage as shown in Appendix C. The chloride content was determined at 3 depths: near the surface (0-1 inch depth), near the design location for top reinforcing steel/tee connections (1 to 2 inch depth), and near the center of the slab (2 to 3 inch depth). Locations were taken in both cast-in-place concrete as well as precast concrete, if present, to determine the extent of chloride contamination in these differing concretes. The results are included in Appendix D. These chloride contents provide an indication of the current and expected future deterioration of the parking structure due to chloride-induced corrosion of the reinforcing steel. A typical threshold chloride value for the onset of corrosion is between 280 and 410 parts per million. The determined values are defined as minor (less than 200 ppm at the 1 to 2 inch depth), moderate (between 200 ppm and 400 ppm at the 1 to 2 inch depth, and large (greater than 400 ppm at the 1 to 2 inch depth. The extent of chloride contamination directly influences our recommended floor surface treatment (nothing, penetrating sealer, traffic topping).

The summary of chlorides test results in Appendix D are;

Level	Depth	Type	PPM
2	1 to 2	CIP	250
3	1 to 2	P/C	50
4	1 to 2	CIP	120
5	1 to 2	P/C	20
Roof	1 to 2	CIP	60

APPENDIX A

WALKER
RESTORATION CONSULTANTS

HUNTINGTON 3 GARAGE

Opinion of Probable Cost for Master Repair Plan
Recommended Phasing : 10 Year Program

	Work Item	Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Structural												
	101	Precast Slab Repair					$ 13,309					
	102	Precast Tee Stem Repair					$ 912					
	103	Precast Beam Repair					$ 575					
	104	Precast Shear Connector Repair					$ 1,197					
	105	Precast Column/Wall Repair	$ 472									
	109	Stair Tread Concrete Repair	$ 3,750									
	110	Epoxy Crack Injection										
	111	Masonry Repair										
	112	Replace Double Tee Bearing Pad										
	113	Repair Loose Bollard										
	115	Structural Repair Allowance @15% (min $1,000.00)	$ 1,000				$ 2,399		$ 1,000			
		Structural Sub-Total	**$ 5,222**	**$ -**	**$ -**	**$ -**	**$ 18,392**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Waterproofing												
	202	Façade Sealant Replacement - Precast							$ 8,480			
	205	Cove Sealant Replacement - Precast Roof					$ 31,860					
	206	Cove Sealant Replacement - Precast Covered Levels							$ 60,547			
	209	Floor Sealant Replacement - Precast Roof					$ 116,573					
	210	Floor Sealant Replacement - Precast Covered Levels							$ 244,145			
	211	Rout and Seal Cracks					$ 12,188					
	212	Traffic Topping Repair										
	213	Traffic Topping - New Installation										
	214	Concrete Sealer										
	215	Masonry Sealer										
	216	Expansion Joint Replacement - Roof							$ 43,125			
	217	Expansion Joint Replacement - Covered Levels										
	218	Caulk Handrail Bases										
	221	Waterproofing Repair Allowance @ 10% (min $1,000.00)	$ 1,000				$ 16,062		$ 35,630			
		Waterproofing Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ 176,682**	**$ -**	**$ 391,926**	**$ -**	**$ -**	**$ -**
Mechanical												
	301	Repair Leaking Drainage Piping										
	302	New Drain & Piping										
	303	Repair Existing Trench Drains										
	305	Mechanical Allowance @ 10% (min $1,000.00)	$ 1,000				$ 1,000		$ 1,000			
		Mechanical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Electrical												
	401	PARC System Replacement						$ 150,000				
	403	Electrical Allowance @ 10% (min $1,000.00)	$ 1,000				$ 1,000	$ 15,000	$ 1,000			
		Electrical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ 165,000**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Miscellaneous												
	501	Paint Curbs, Wheelstops and Islands Safety Yellow							$ 6,023			
	502	Repaint Traffic Markings							$ 27,375			
	503	Clean and Paint Metal Pan Stairs										
	504	Repair Loose Stair Nosings										
	505	Replace Door, Frame and Hardware										
	506	Clean and Paint Door and Door Frame										
	507	Repaint Stair Railings										
	508	Railing Infill for Excessive Gap										
	509	Install Fencing under Lowest Stair Run										
	510	Replace Stair Tower Roof										
	511	Repair Broken Handrail					$ 3,125					
		Miscellaneous Sub-Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ 3,125**	**$ -**	**$ 33,398**	**$ -**	**$ -**	**$ -**
		Construction Subtotal	$ 8,222	$ -	$ -	$ -	$ 200,199	$ 165,000	$ 428,324	$ -	$ -	$ -
		Mobilization @ 6% of Construction Subtotal	$ 493	$ -	$ -	$ -	$ 12,012	$ 9,900	$ 25,699	$ -	$ -	$ -
		Construction Total	**$ 8,716**	**$ -**	**$ -**	**$ -**	**$ 212,210**	**$ 174,900**	**$ 454,023**	**$ -**	**$ -**	**$ -**
		Project Contingency @ 15%	$ 1,307	$ -	$ -	$ -	$ 31,832	$ 26,235	$ 68,104	$ -	$ -	$ -
		Engineering: Contract Documents/Field Rep @ 15%	$ 1,307	$ -	$ -	$ -	$ 31,832	$ 26,235	$ 68,104	$ -	$ -	$ -
		Material Testing During Construction	$ 87	$ -	$ -	$ -	$ 2,122	$ 1,749	$ 4,540	$ -	$ -	$ -
		Project Cost Totals Per Year:	**$ 11,417**	**$ -**	**$ -**	**$ -**	**$ 277,996**	**$ 229,119**	**$ 594,771**	**$ -**	**$ -**	**$ -**

NOTES:

1. Estimated costs are based on multi-year construction seasons.
2. Estimated costs are based on historical records of similar types of work.
   Costs may vary due to time of year, local economy, or other factors.
3. Costs assume no hazardous waste and a landfill located within 50 miles.
4. Cost based on normal work week, daylight hours and non-union labor.

APPENDIX B

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Photo 1

South entrance.

Photo 2

South entrance bridge.

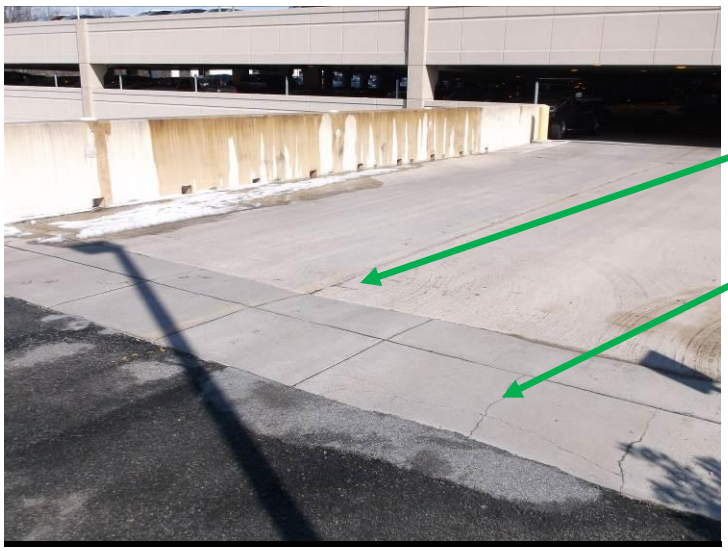


Photo 3

Tee flange corner cracking.

Cracking in wash.

Photo 4

Tee to tee joint leaking on bridge soffit.

Photo 5

Damaged tee flange corner.

Leaching on end of tee stem.

Photo 6

No vehicular impact bumper.

Photo 7

Stair tower at top level.

Photo 8

North entrance.

Photo 9

Spall on exterior column.

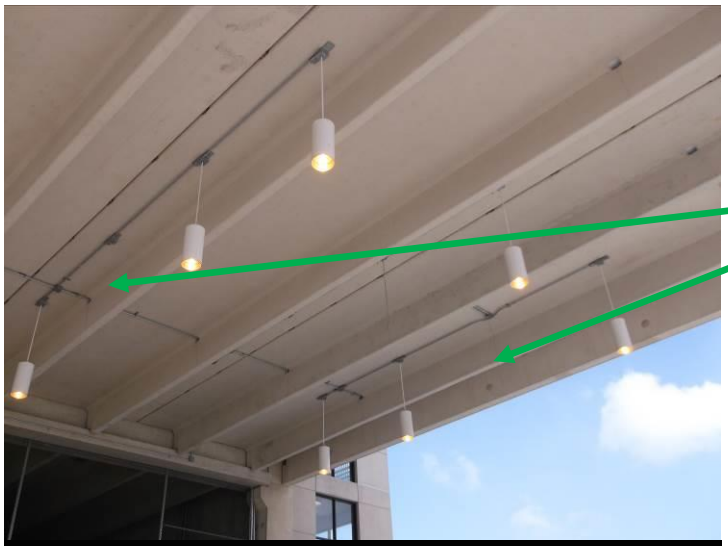


Photo 10

Soffit showing locations of lights fallen from electrical junction boxes beneath north entrance.

Photo 11

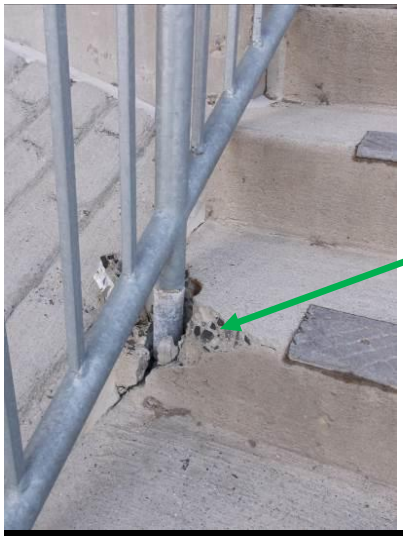
Spall on stair landing. Black stair nosings provide color contrast so no yellow paint is recommended.

Photo 12

Spall on stair landing. Black stair nosings provide color contrast so no yellow paint is recommended.

Damaged railing to stair connection.

Photo 13



Damaged railing to stair connection.

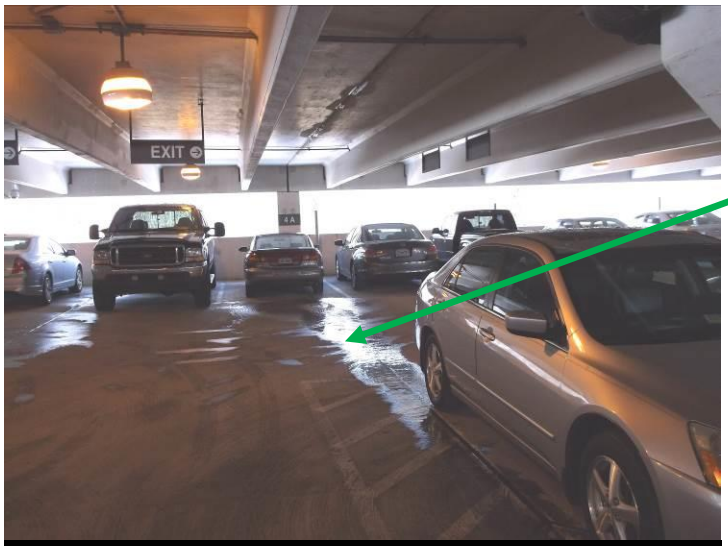
Photo 14

Spall on stair landing.

Photo 15

Ponding at leaking joints between double tees and inverted tee beams

Photo 16



Ponding at locations of leaking joints between double tees.

Photo 17

Ponding at locations of leaking joints between double tees.

Photo 18

APPENDIX C

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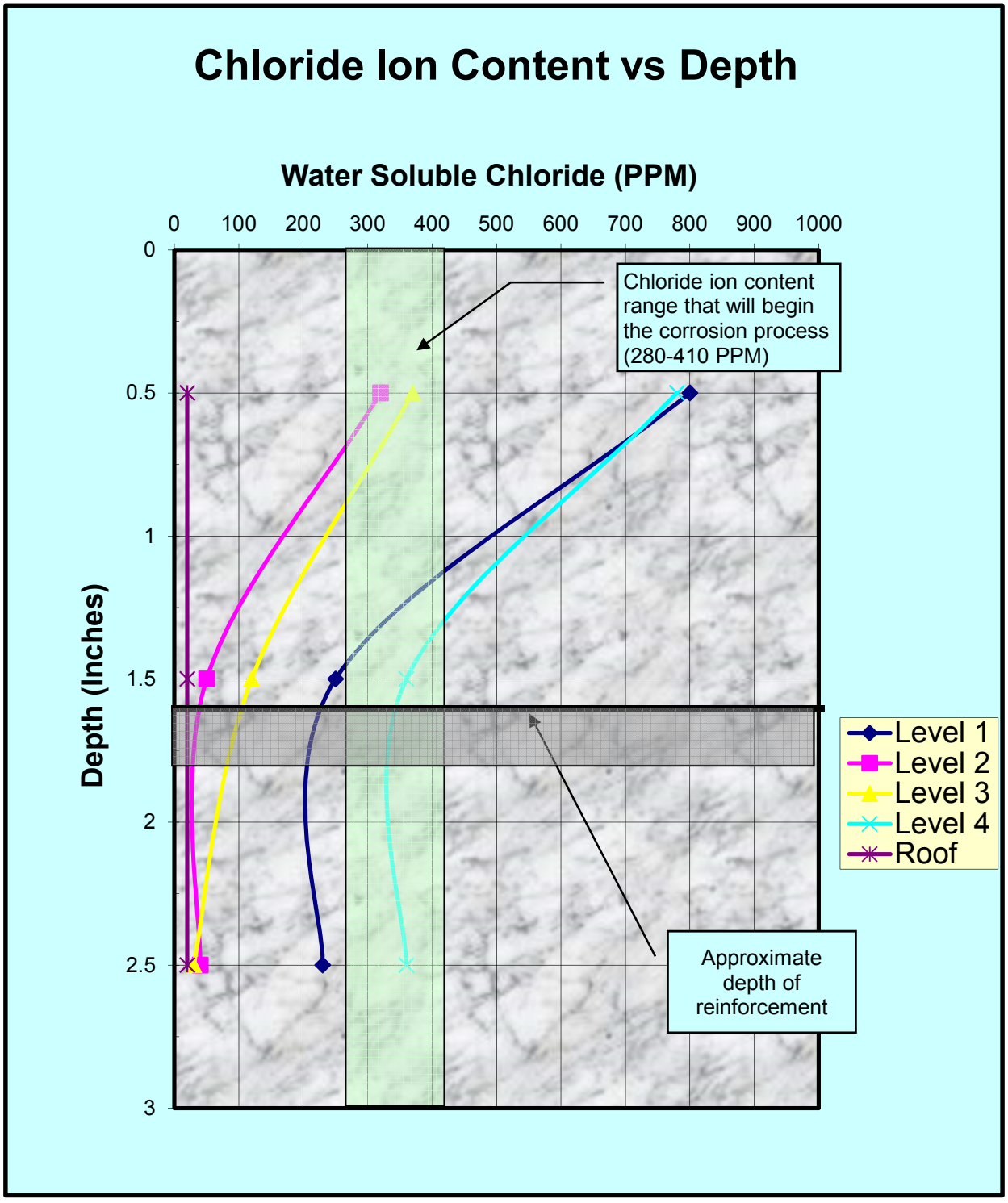
Project # 14-3944.04
Date Jun-14



UNIVERSAL CONSTRUCTION TESTING, Ltd.

Project: Washington Metropolitan Area Transit Authority
Maryland, Virginia & Washington DC

UCT Project No. 14066
Walker Project No. 14-3994.00

Client: Walker Restoration Consultants

Date: April 14, 2014

Table 1.3. **Chloride Content of Concrete**
(Water-Soluble)
AASHTO T 260

Sample Number	Location in Structure	Level tested, inch from top	Chloride ion (CL^-) Content		
			by weight of concrete %	by weight of cement* %	by weight of concrete (ppm)*
Huntington 3 Garage					
1	Level 1	0-1	0.080	**0.50**	800
		1-2	0.025	**0.15**	250
		2-3	0.023	**0.14**	230
2	Level 2	0-1	0.032	**0.70**	320
		1-2	0.005	**0.04**	50
		2-3	0.004	**0.03**	40
3	Level 3	0-1	0.037	**0.23**	370
		1-2	0.012	**0.08**	120
		2-3	0.003	**0.02**	30
4	Level 4	0-1	0.078	**0.49**	780
	Roof	1-2	0.036	**0.23**	360
		2-3	0.036	**0.23**	360
Roof	Level 5	0-1	0.002	**0.01**	20
	Roof	1-2	0.002	**0.01**	20
		2-3	0.002	**0.01**	20

Remarks: *) Assumed cement content 600 lbs/cu.yd. and U.W. = 3800 pcy.

APPENDIX D

WALKER
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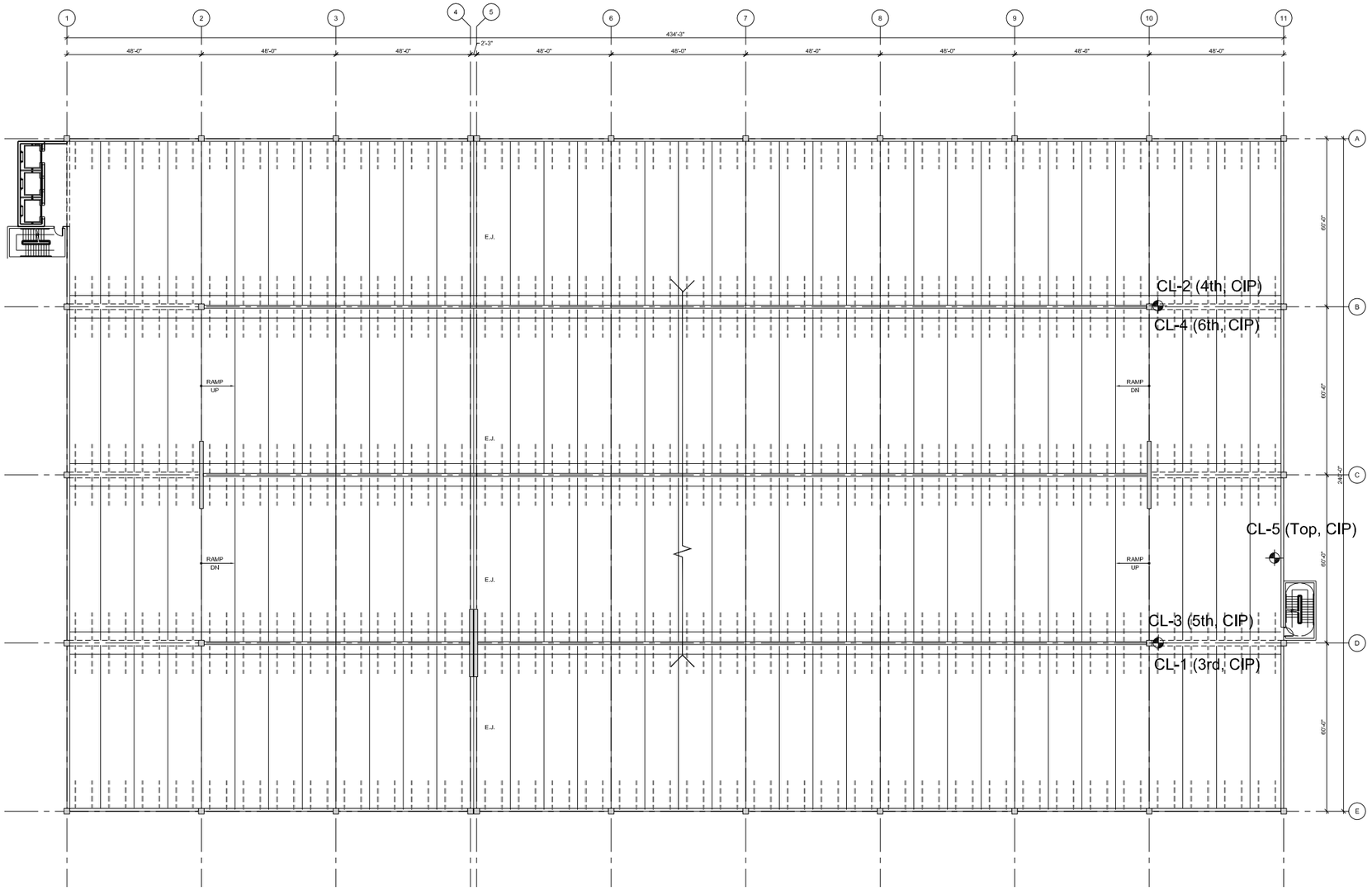
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY - HUNTINGTON 3 GARAGE
ALEXANDRIA, VIRGINIA

WALKER PARKING CONSULTANTS

CHLORIDES
SAMPLE LOCATIONS



LEGEND:

CL-1 CONCRETE SAMPLE
THE FIRST NUMBER REFERS TO THE SAMPLE NUMBER. THE SECOND NUMBER REFERS TO THE FLOOR WHERE THE SAMPLE WAS TAKEN. THE FINAL SYMBOL (P/C = PRECAST, CIP = CAST IN PLACE) REFERS TO THE TYPE OF CONCRETE FROM WHICH THE SAMPLE WAS TAKEN. TAKEN 4/14/2014

LEGEND

NORTH

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

R-701

04/03/2014 14-944.00

APPENDIX E

WALKER
RESTORATION CONSULTANTS

Kletsko, Marissa

From: Neiderer, Greg
Sent: Wednesday, March 26, 2014 8:55 PM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Stairs, Kathryn; Gross, Jason @ Walker; Juzwiak, Joseph
Subject: 2014 03 26 Huntington Central Garage Pendant Lights
Attachments: 2014 03 26 Huntington Central GJN 18.jpg; 2014 03 26 Huntington Central GJN 46.jpg

Patrick,

While at Huntington we observed that 5 of the 16 pendant lights were missing at this entrance. We noticed these lights swing dramatically in the brisk winds we experienced today and suspect the 5 lights blew off in heavy winds. I would inform Phillips Lighting of this so they choose an appropriate anchoring system when replacing these lights.

Gregory J. Neiderer, PE
Principal

Walker Restoration Consultants | Walker Parking Consultants
565 East Swedesford Road, Suite 300 | Wayne, PA 19087
610.995.0260 x 1408 (Office) | 610.659.6967 (Cell) | 610.995.0261 (Fax) www.walkerrestoration.com | www.walkerparking.com

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Kletsko, Marissa

From: Neiderer, Greg
Sent: Wednesday, March 26, 2014 8:56 PM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Stairs, Kathryn; Gross, Jason @ Walker
Subject: 2014 03 26 Huntington Central Garage Column Spall
Attachments: 2014 03 26 Huntington Central GJN 15.jpg; 2014 03 26 Huntington Central GJN 12.jpg

Patrick,

While at Huntington we observed a spall on the long column in the attached photos. The spall is likely to fall in an area that is not a typical walking or driving path. We recommend you remove or strap this spall promptly and that a permanent repair occur this summer.

Gregory J. Neiderer, PE
Principal

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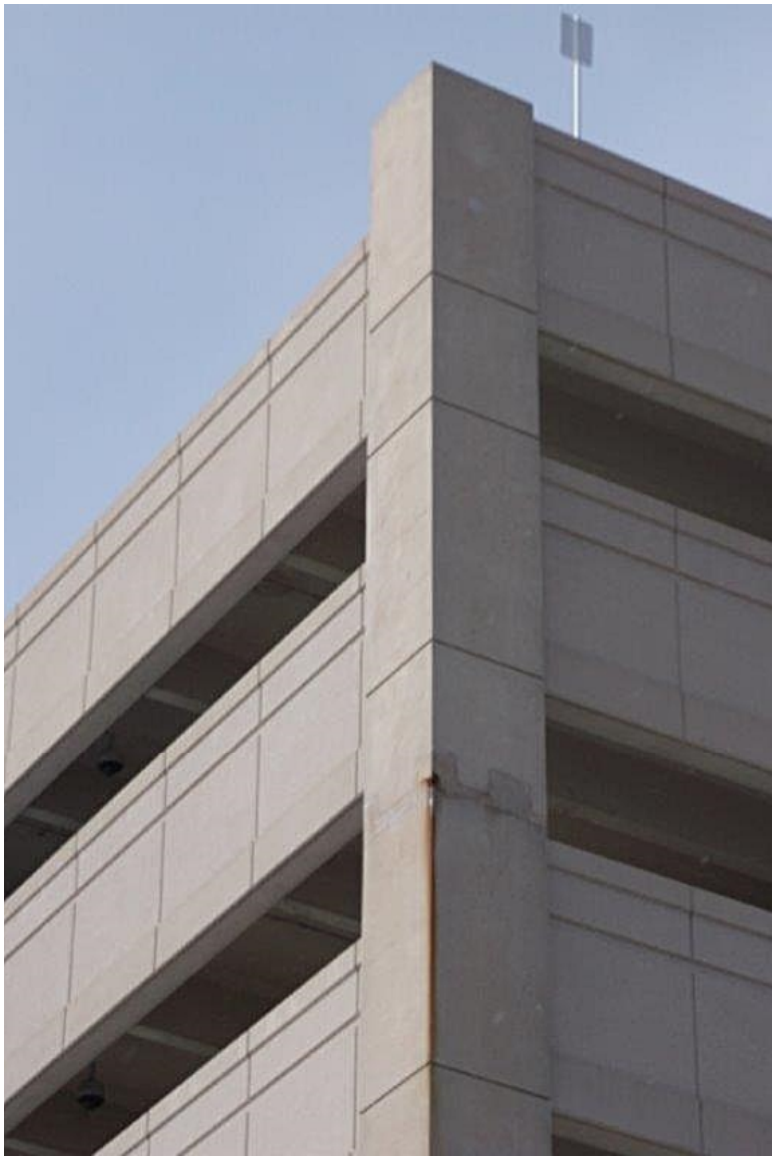

Kletsko, Marissa

From: Neiderer, Greg
Sent: Wednesday, March 26, 2014 9:11 PM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Stairs, Kathryn; Gross, Jason @ Walker
Subject: 2014 03 26 Huntington Central Garage Supplimental Stair Foor Spalls
Attachments: 2014 03 26 Huntington Central GJN 42.jpg; 2014 03 26 Huntington Central GJN 41.jpg

Patrick,

While at Huntington we observed floor spalls on about 6 locations at landings in the supplemental stairs (the tower with no elevators) as shown in the attached photos. We recommend you repair these spalls promptly and that a permanent repair occur this summer.

Gregory J. Neiderer, PE
Principal

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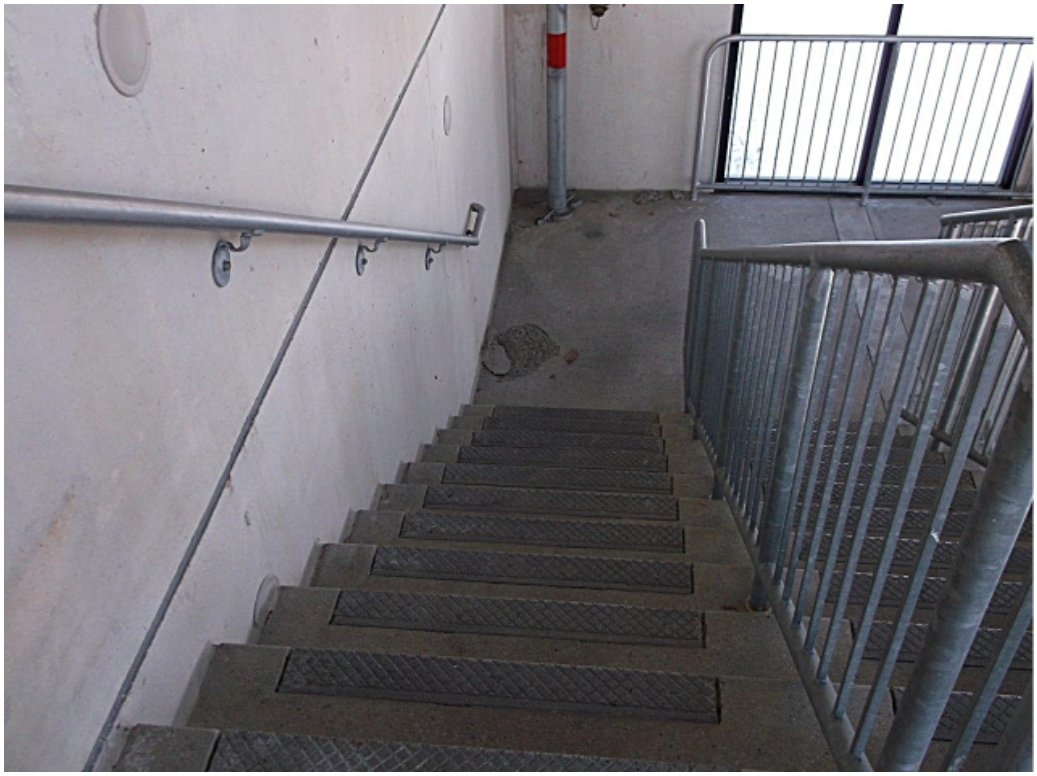



STAIR B
LEVEL 2
YOU ARE 3 LEVELS
ABOVE STATION
EXIT TO STATION

HUNTINGTON NORTH

WALKER
RESTORATION CONSULTANTS

FEBRUARY 2015 14-3944.04

The summary data for the facility is as follows:

Table HUNTN-1: Facility Information Summary

	HUNTINGTON NORTH
Location:	Huntington Ave & Fenwick Dr. Alexandria, VA 22303
Overall Condition:	**FAIR**
Current Needs:	**MINOR**
Chloride Contamination	**MINOR**
Year built:	1993
Supported Levels	4
Levels Below Grade	.5
Parking Space Capacity:	1,281
Parking Efficiency:	276 SF/Space
Footprint:	Varies, 433'6" x 302'
Bridges:	None
Vehicle Circulation:	Single Helix
Pedestrian Circulation	4 Stair(s), 0 Elevator(s)
Parking Area: Slab on Grade Total Supported Area Total Parking Area	 108,200 ± SF 246,400 ± SF 354,600 ± SF
Structural System	Precast Un-topped Double Tee
Façade Spandrel Treatment	Precast with Aluminum Railing

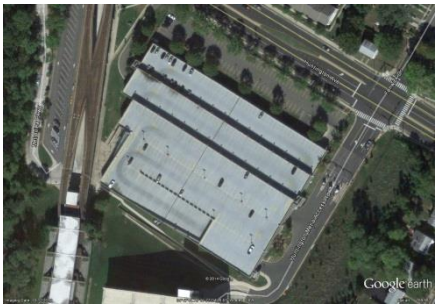
FACILITY DESCRIPTION

NORTH VIEW

SOUTH VIEW

EAST VIEW

WEST VIEW



PLAN VIEW

FEBRUARY 2015 14-3944.04

EXECUTIVE SUMMARY

This 1993 garage is in fair shape, has minor chloride contamination and has minor current repair needs

Its scheduled repairs are anticipated to cost:

2019 – Near Term - $373,645
2024 – Long-term - $780,262

See Appendix A for cost details.

CRITICAL REPAIRS

The following safety related items requiring urgent action were identified in our 4/15/14 email to Metro:

1. Overhead spalls beneath main stairs
2. Loose bollard adjacent to curb (trip hazard)
3. Broken handrail
4. Missing trench drain covers
5. Broken wall mounted light fixtures

Please see the above reference email, found in Appendix E, for more detail and recommended actions. We have no further immediate concerns.

NEAR-TERM REPAIRS

Due to the age and condition of the garage we recommend most of the non-critical repairs be completed in 2019, year four of the master repair plan. These near-term repairs include addressing the structural items found including:

1. Remove and replace spalled overhead concrete found on stair soffits with repair concrete anchored with supplementary embedded steel pins. Monitor this condition at least every 6 months until replacement and remove loose concrete.
2. Reweld double tee floor connections
3. Repair spalled concrete at double tee floor connections
4. Install new supplemental floor drains

RECOMMENDATIONS

5. Install new supplemental floor piping
6. Repaint stairtower nosing
7. Repair façade handrails

Based on chloride test results, we do not recommend any improvements to protect the floor structural system.

LONG-TERM REPAIRS

Long term repairs include a second round of structural and waterproofing repairs in 2024, five years after the near-term repairs to address continued deterioration of the concrete and the end of the useful life of the waterproofing products. Long-term repairs items include the following:

1. Replace interior level floor sealants
2. Replace façade joint sealants
3. Replace roof level expansion joint glands
4. Replace interior level expansion joint glands
5. Repaint traffic markings
6. Repaint curbs

OBSERVATIONS AND DISCUSSION

CONDITION ASSESSMENT

The following observations were made during a facility walk through on the April 8 to 10, 2014 site visit. Photographs referenced within the observations are found in Appendix B of the report. Observations are immediately followed by a brief discussion of the repair in italics.

1. Roof level floor sealants are in good condition beneath traffic topping and require replacement beyond 10 years. (Photo 1,2,4,5,8)
2. Interior floor sealants are in fair condition and require replacement within 10 years. (Photo 21)
3. Roof level expansion joints are in good condition and require replacement within 10 years. (Photo 3,7)
4. Interior level expansion joints are in good condition and require replacement within 10 years.
5. A minor portion of the roof level traffic topping is damaged by delaminations of tee to tee connections which requires repair (Photo 1,2).
6. Changes in floor elevation- curbs, handicap ramps, steps and stair tread nosings, are readily visually apparent. (Photo 5,6)
7. Significant stair soffit delaminations were observed

and loose concrete requires removal now. (Photo 17,18,19)

8. A moderate number of the double tee to double tee welded connections were observed to be rusting which requires structural repair (Photo 13).
9. A minor amount of the concrete adjacent to double tee to double tee welded connections was observed to be cracked and spalling which requires structural repair. (Photo 2,13)
10. The perimeter handrails are damaged and require repair now. (Photo 9,10).
11. A minor amount of localized ponding was observed and new supplemental drains need to be installed. (Photo 4)
12. A number of trench drain grates are missing and require replacement now to eliminate trip hazards. (Photo 14,15)
13. A number of lights have broken lenses that permits people to reach into fixture and requires replacement to eliminate danger. We understand these lights are already scheduled for replacement. (Photo 20)
14. Previous repairs to tee stems and tee flanges are working well. (Photo 11,12,16)

MATERIAL TESTING

Concrete powder samples were extracted from floor surfaces of the roof and intermediate supported levels of the parking garage as shown in Appendix C. The chloride content was determined at 3 depths: near the surface (0-1 inch depth), near the design location for top reinforcing steel/tee connections (1 to 2 inch depth), and near the center of the slab (2 to 3 inch depth). Locations were taken in both cast-in-place concrete as well as precast concrete, if present, to determine the extent of chloride contamination in these differing concretes. The results are included in Appendix D. These chloride contents provide an indication of the current and expected future deterioration of the parking structure due to chloride-induced corrosion of the reinforcing steel. A typical threshold chloride value for the onset of corrosion is between 280 and 410 parts per million. The determined values are defined as minor (less than 200 ppm at the 1 to 2 inch depth), moderate (between 200 ppm and 400 ppm at the 1 to 2 inch depth, and large (greater than 400 ppm at the 1 to 2 inch depth. The extent of

chloride contamination directly influences our recommended floor surface treatment (nothing, penetrating sealer, traffic topping).

The summary of chlorides test results in Appendix C are:

Level	Depth	Type	PPM
2	1 to 2	P/C	110
3	1 to 2	P/C	20
4	1 to 2	P/C	40
5	1 to 2	CIP	260

APPENDIX A

WALKER
RESTORATION CONSULTANTS

HUNTINGTON NORTH GARAGE

Opinion of Probable Cost for Master Repair Plan
Recommended Phasing : 10 Year Program

	Work Item	Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Structural												
	101	Precast Slab Repair	$ 21,622			$ 194,594						
	102	Precast Tee Stem Repair				$ 7,405						
	103	Precast Beam Repair				$ 4,673						
	104	Precast Shear Connector Repair				$ 9,724						
	105	Precast Column/Wall Repair				$ 3,836						
	109	Stair Tread Concrete Repair										
	110	Epoxy Crack Injection										
	111	Masonry Repair										
	112	Replace Double Tee Bearing Pad										
	113	Repair Loose Bollard	$ 1,125									
	115	Structural Repair Allowance @15% (min $1,000.00)	$ 3,412			$ 33,035					$ 1,000	
		Structural Sub-Total	**$ 26,159**	**$ -**	**$ -**	**$ 253,267**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**
Waterproofing												
	202	Façade Sealant Replacement - Precast									$ 5,740	
	205	Cove Sealant Replacement - Precast Roof										
	206	Cove Sealant Replacement - Precast Covered Levels									$ 30,333	
	209	Floor Sealant Replacement - Precast Roof										
	210	Floor Sealant Replacement - Precast Covered Levels										
	211	Rout and Seal Cracks										
	212	Traffic Topping Repair									$ 365,625	
	213	Traffic Topping - New Installation										
	214	Concrete Sealer										
	215	Masonry Sealer										
	216	Expansion Joint Replacement - Roof									$ 43,125	
	217	Expansion Joint Replacement - Covered Levels									$ 43,125	
	218	Caulk Handrail Bases										
	221	Waterproofing Repair Allowance @ 10% (min $1,000.00)	$ 1,000			$ 1,000					$ 48,795	
		Waterproofing Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 536,743**	**$ -**
Mechanical												
	301	Repair Leaking Drainage Piping										
	302	New Drain & Piping				$ 4,813						
	303	Repair Existing Trench Drains	$ 8,250									
	305	Mechanical Allowance @ 10% (min $1,000.00)	$ 1,000			$ 1,000					$ 1,000	
		Mechanical Sub-Total	**$ 9,250**	**$ -**	**$ -**	**$ 5,813**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**
Electrical												
	401	PARC System Replacement							$ 150,000			
	403	Electrical Allowance @ 10% (min $1,000.00)	$ 1,000			$ 1,000			$ 15,000		$ 1,000	
		Electrical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ 165,000**	**$ -**	**$ 1,000**	**$ -**
Miscellaneous												
	501	Paint Curbs, Wheelstops and Islands Safety Yellow				$ 4,876						
	502	Repaint Traffic Markings									$ 22,163	
	503	Clean and Paint Metal Pan Stairs										
	504	Repair Loose Stair Nosings										
	505	Replace Door, Frame and Hardware										
	506	Clean and Paint Door and Door Frame										
	507	Repaint Stair Railings										
	508	Railing Infill for Excessive Gap										
	509	Install Fencing under Lowest Stair Run										
	510	Replace Stair Tower Roof										
	511	Repair Broken Handrail	$ 3,125			$ 3,125						
		Miscellaneous Sub-Total	**$ 3,125**	**$ -**	**$ -**	**$ 8,001**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 22,163**	**$ -**
		Construction Subtotal	$ 40,534	$ -	$ -	$ 269,080	$ -	$ -	$ 165,000	$ -	$ 561,906	$ -
		Mobilization @ 6% of Construction Subtotal	$ 2,432	$ -	$ -	$ 16,145	$ -	$ -	$ 9,900	$ -	$ 33,714	$ -
		Construction Total	**$ 42,966**	**$ -**	**$ -**	**$ 285,225**	**$ -**	**$ -**	**$ 174,900**	**$ -**	**$ 595,620**	**$ -**
		Project Contingency @ 15%	$ 6,445	$ -	$ -	$ 42,784	$ -	$ -	$ 26,235	$ -	$ 89,343	$ -
		Engineering: Contract Documents/Field Rep @ 15%	$ 6,445	$ -	$ -	$ 42,784	$ -	$ -	$ 26,235	$ -	$ 89,343	$ -
		Material Testing During Construction	$ 430	$ -	$ -	$ 2,852	$ -	$ -	$ 1,749	$ -	$ 5,956	$ -
		Project Cost Totals Per Year:	**$ 56,285**	**$ -**	**$ -**	**$ 373,645**	**$ -**	**$ -**	**$ 229,119**	**$ -**	**$ 780,262**	**$ -**

NOTES:

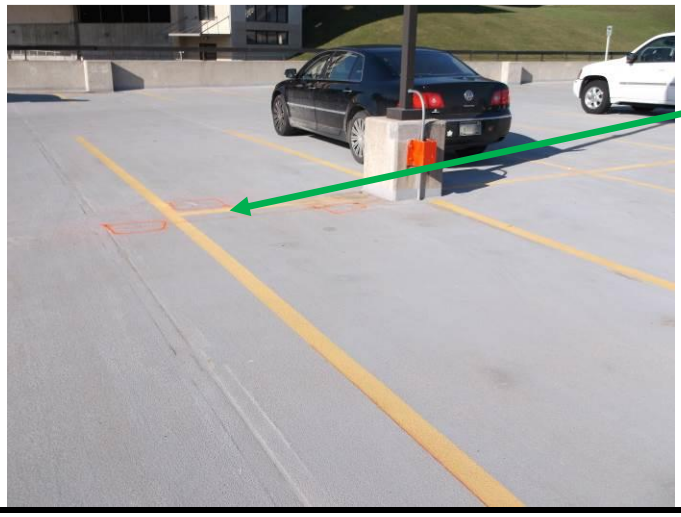
1. Estimated costs are based on multi-year construction seasons.
2. Estimated costs are based on historical records of similar types of work.
   Costs may vary due to time of year, local economy, or other factors.
3. Costs assume no hazardous waste and a landfill located within 50 miles.
4. Cost based on normal work week, daylight hours and non-union labor.

APPENDIX B

WALKER
RESTORATION CONSULTANTS

Top level is traffic topped and exhibits delamination along inverted tee beam.

Photo 1

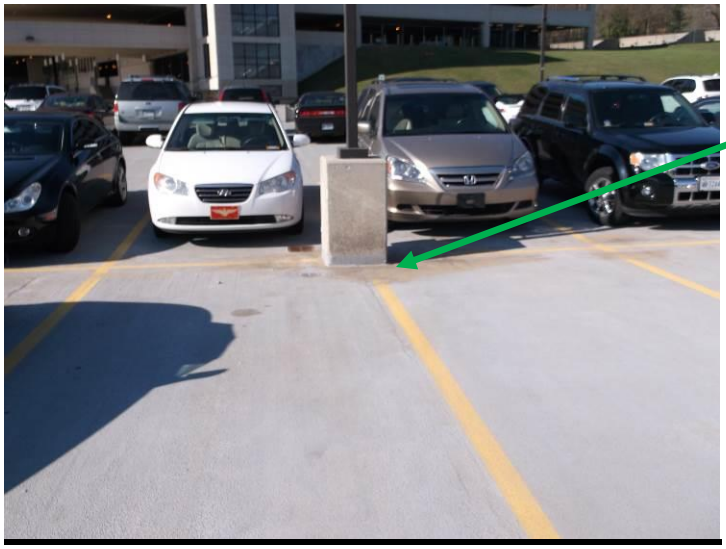


Areas of delamination along inverted tee beam.

Photo 2

Expansion joint is in good condition.

Photo 3



Staining indicates ponding at roof level.

Photo 4

Damaged pipe bollard.

Photo 5

Curbs are painted yellow.

Photo 6

Expansion joint is in good condition.

Photo 7

Damaged railing and sign.

Photo 8

Damaged railing and sign.

Photo 9

Damaged railing.

Photo 10

Previously repaired tee bearing pocket.

Photo 11

Previously repaired tee stems.

Photo 12

Leaching and rusting at tee to tee connection.

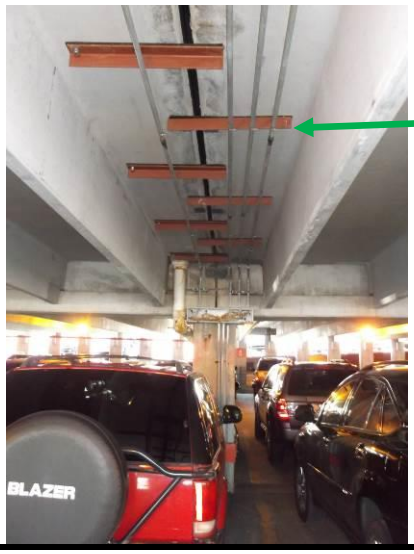
Photo 13

Trench drain cover is missing.

Photo 14

Trench drain cover is missing.

Photo 15



Shear transfer device.

Photo 16

Exterior stair.

Photo 17

Leaching and rusting on underside of stairs.

Photo 18

Leaching and rusting on underside of stairs.

Photo 19

Broken light.

Photo 20

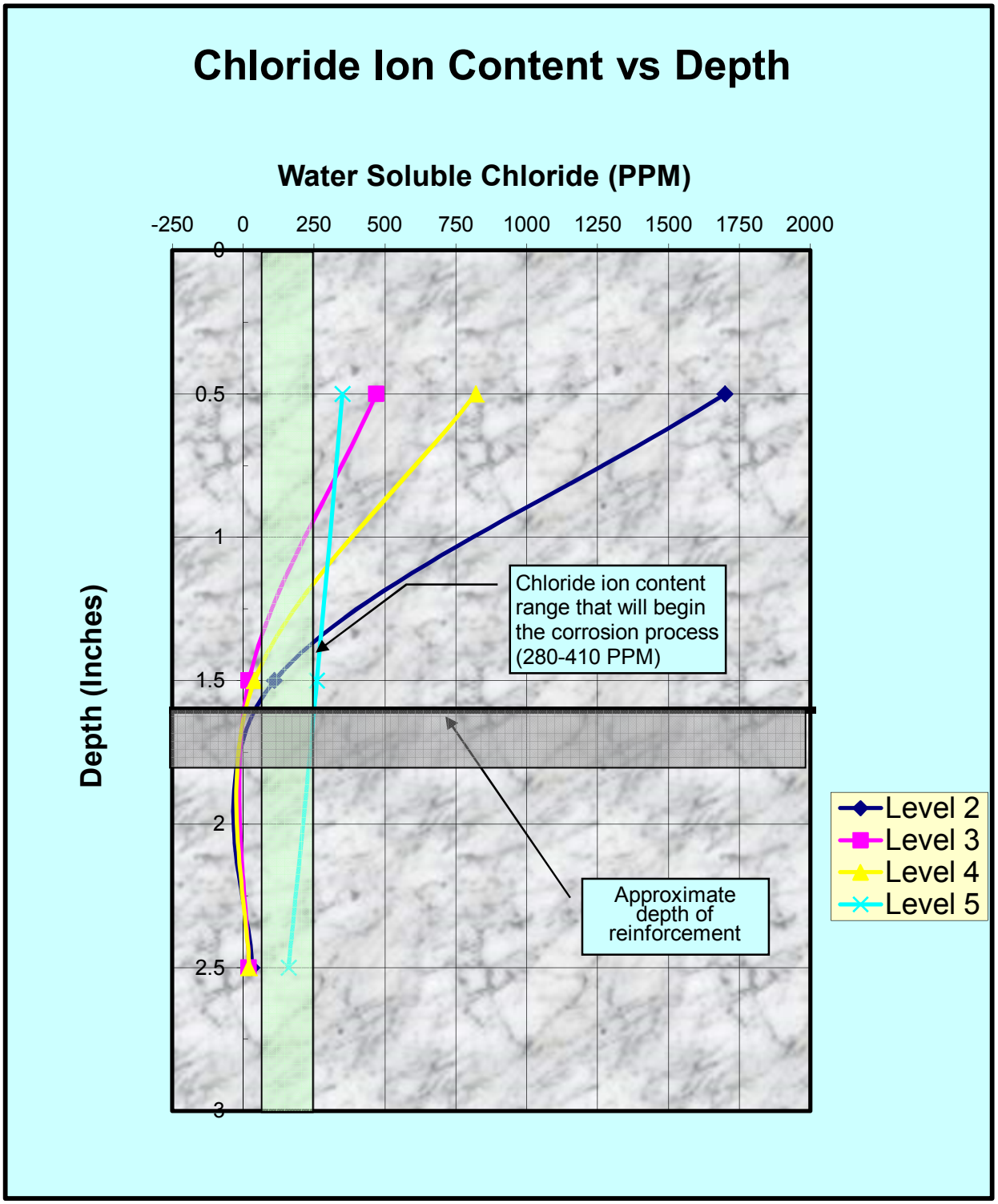
Typical previous repair at tee to inverted tee beam welded connection on lower levels.

Photo 21

APPENDIX C

WALKER
RESTORATION CONSULTANTS

Project # 14-3944.04
Date Jun-14



UNIVERSAL CONSTRUCTION TESTING, Ltd.

Project: Washington Metropolitan Area Transit Authority
Maryland, Virginia & Washington DC

UCT Project No. 14066
Walker Project No. 14-3994.00

Client: Walker Restoration Consultants

Date: April 14, 2014

Table 1.4. **Chloride Content of Concrete**
(Water-Soluble)
AASHTO T 260

Sample Number	Location in Structure	Level tested, inch from top	Chloride ion (CL^-) Content		
			by weight of concrete %	by weight of cement* %	by weight of concrete (ppm)*
Huntington North Garage					
2	Level 2	0-1	0.170	**1.07**	1700
		1-2	0.011	**0.07**	110
		2-3	0.003	**0.02**	30
3	Level 3	0-1	0.047	**0.30**	470
		1-2	0.002	**0.01**	20
		2-3	0.002	**0.01**	20
4	Level 4	0-1	0.082	**0.52**	820
		1-2	0.004	**0.03**	40
		2-3	0.002	**0.01**	20
5	Level 5	0-1	0.035	**0.22**	350
	Roof	1-2	0.026	**0.17**	260
		2-3	0.016	**0.10**	160

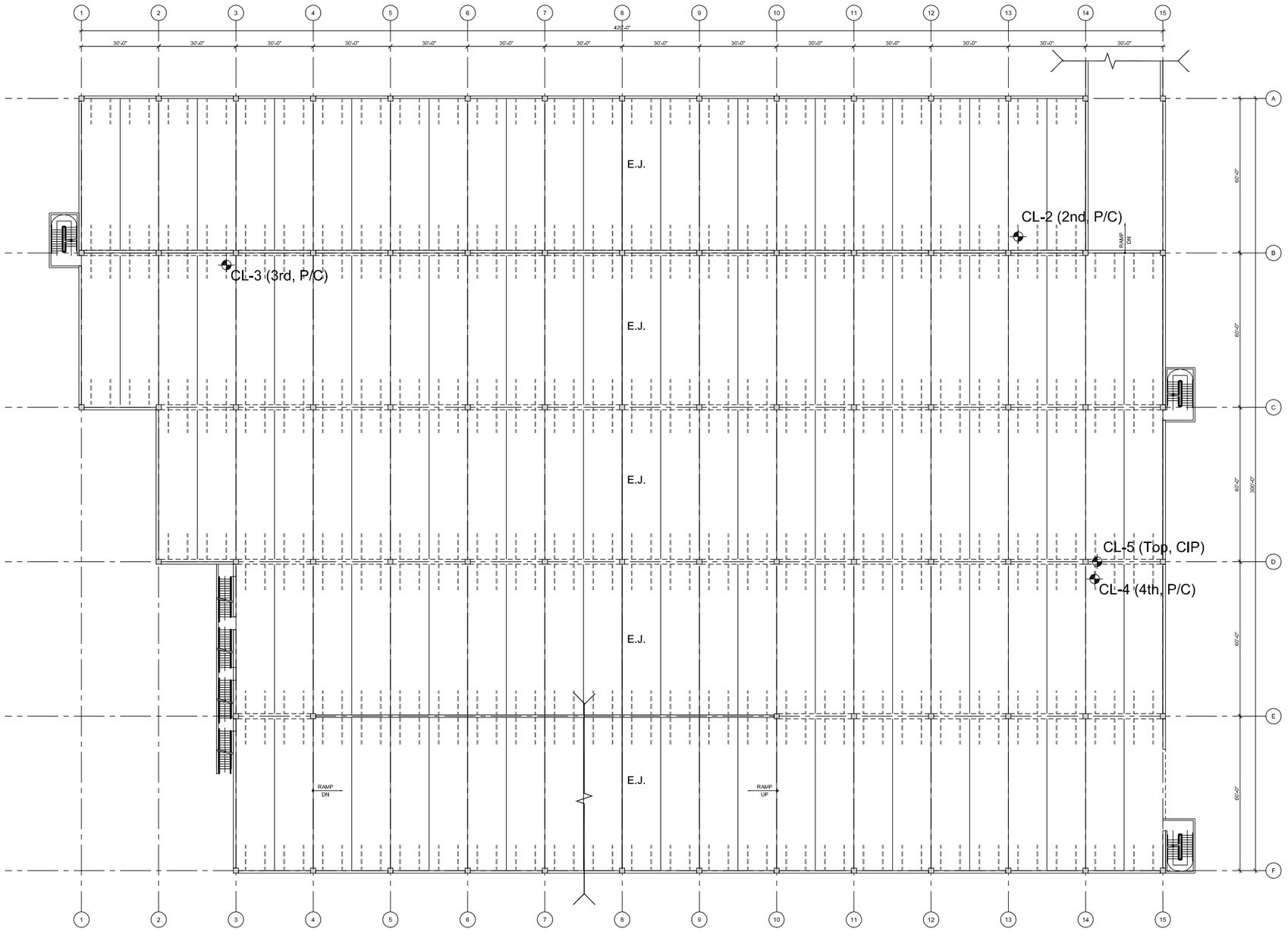
Remarks: *) Assumed cement content 600 lbs/cu.yd. and U.W. = 3800 pcy.

APPENDIX D

WALKER
RESTORATION CONSULTANTS

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY - HUNTINGTON NORTH GARAGE
ALEXANDRIA, VIRGINIA

WALKER PARKING CONSULTANTS



CHLORIDES
SAMPLE LOCATIONS

LEGEND:

CL-1 CONCRETE SAMPLE
THE FIRST NUMBER REFERS TO THE SAMPLE NUMBER. THE SECOND NUMBER REFERS TO THE FLOOR WHERE THE SAMPLE WAS TAKEN. THE FINAL SYMBOL (P/C = PRECAST, CIP = CAST IN PLACE) REFERS TO THE TYPE OF CONCRETE FROM WHICH THE SAMPLE WAS TAKEN. TAKEN 4/ /2014

LEGEND

NORTH

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

R-701

04/03/2014 14-044.00

APPENDIX E

WALKER
RESTORATION CONSULTANTS

Kletsko, Marissa

From:	Neiderer, Greg
Sent:	Tuesday, April 15, 2014 5:19 PM
To:	Patrick Schmitt @ WMATA Pkg
Cc:	Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Stairs, Kathryn; Gross, Jason @ Walker
Subject:	2014 04 15 WMATA Huntington North Garage Urgent Actions - Stair Spall, Spandrel Handrail, Light Fixture Covers, Bollard
Attachments:	2014 04 10 WMATA Huntington North GJN 44.jpg; 2014 04 10 WMATA Huntington North GJN 17.jpg; 2014 04 10 WMATA Huntington North GJN 20.jpg; 2014 04 10 WMATA Huntington North GJN 24.jpg; 2014 04 10 WMATA Huntington North GJN 33.jpg; 2014 04 10 WMATA Huntington North GJN 34.jpg

Patrick,

Upon reviewing the garage at the above station we found:

1. A large cracked, stained soffit spall beneath the concrete cascading stairs to the station. Do to it location (beneath a walkway) and height (about 20 feet in the air) we recommend either removal, tapping to determine if immediate removal is needed, or if netting to keep it from falling. Please see attached photos 20 and 24
2. At one location it appears the snow operator has damaged the handrail and so the wall is shorter than code required. We recommend fixing of installation of a temporary handrail. Please see attached photos 33 and 34
3. There are numerous wall mounted light fixture that are actually mounted to the spandrel panel and roughly 36 inches above grade. These primarily occur on the most Northern roof levels which change as the garages top level cascades done the hill. Many of these fixtures have had their lens broken (perhaps from snow plow operations or large vehicle bumper impacts) which may present a safety hazard if pedestrians reach into the fixture. Please see attached photo 17.
4. A pipe bollard is loose and laying in the path of travel next to the stairs closest to Huntington III. Please see attached photo 44.

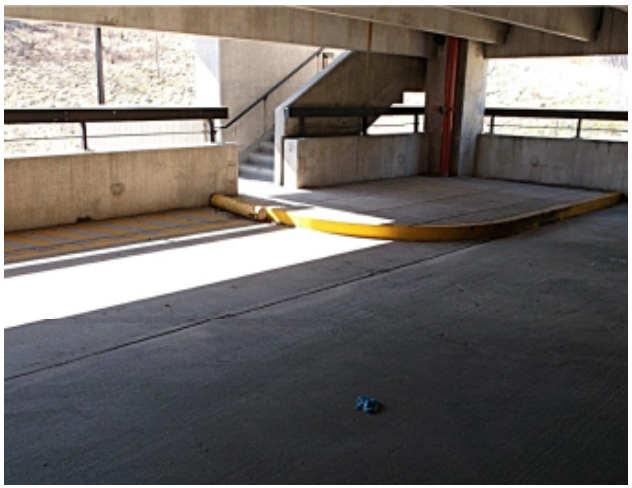
Sincerely,

Gregory J. Neiderer, PE
Principal

Walker Restoration Consultants | Walker Parking Consultants
565 East Swedesford Road, Suite 300 | Wayne, PA 19087
610.995.0260 x 1408 (Office) | 610.659.6967 (Cell) | 610.995.0261 (Fax) www.walkerrestoration.com | www.walkerparking.com

To send me a file larger than 10MB, please use this File Transfer


SNOW
DUMPING



HUNTINGTON SOUTH

WALKER
RESTORATION CONSULTANTS

The summary data for the facility is as follows:

Table HUNTS-1: Facility Information Summary

	HUNTINGTON SOUTH
Location:	5875 North Kings Highway Alexandria, VA 22303
Overall Condition:	**POOR**
Current Needs:	**LARGE**
Chloride Contamination:	**MODERATE**
Year built:	1983
Supported Levels:	2
Levels Below Grade:	NONE
Parking Space Capacity	885
Parking Efficiency:	305 SF/Space
Footprint:	Approximately 500' x 180'
Bridges:	NONE
Vehicle Circulation:	Single Helix
Pedestrian Circulation:	5 Stair(s)
Parking Area: Ground (S.O.G.) Total Supported Area Total Parking Area	 90,000 ± SF 180,000 ± SF 270,000 ± SF
Structural System:	Post-Tensioned 1-way slab and beam
Façade Spandrel Treatment:	Cast-in-Place

FACILITY DESCRIPTION


NORTH ELEVATION


SOUTH ELEVATION


EAST ELEVATION


WEST ELEVATION


PLAN VIEW

EXECUTIVE SUMMARY

This 1983 garage is in poor shape, has moderate chloride contamination and has current repair needs. While chloride contamination is moderate, the extent of spalling, cracking and leaching requires us to rank this as the most heavily deteriorated garage within the Metro system. Of particular concern is the fact that post-tensioned garages may show minimal visible deterioration until they are near collapse. Based on available evidence, this garage is likely to either require essentially 100% of supported slab replacement or total garage demolition and replacement. An in-depth study to confirm our visual assessment and to determine the courses of action and associated cost is recommended.

Its scheduled repairs are anticipated to cost:

2017 – Near Term - $20,653,303

See Appendix A for cost details.

CRITICAL REPAIRS

The following safety related items requiring urgent action were identified in our 4/16/14 email to Metro:

1. Overhead spalls
2. Floor slab spalls
3. In-depth study to determine long-term solution

Please see the above reference email, found in Appendix E, for more detail and recommended actions. We have no further immediate concerns.

NEAR-TERM REPAIRS

Due to the age and condition of the garage we recommend most of the repairs be completed in 2017, year two of the master repair plan. These near-term repairs include addressing the structural items found including:

1. Remove and replace all floor slabs while saving the energized post-tensioned beams. This will require careful phasing to replace the slab in portions to maintain a minimal dead load on the beams.

RECOMMENDATIONS

Monitor the existing condition at least every 2 months until replacement and remove loose concrete.
2. Remove and replace stair treads and landings in the metal pan stairs.
3. Provide in-depth study within the next 4 months including a statistically significant number of test pits to confirm slab and beam tendon condition.

Based on chloride test results, we would typically recommend installing traffic topping on the floor structural system, however, based on our nationwide experience with other similar garages, we advise on urgent in-depth study to confirm our recommendation for extensive slab replacement. Our total repair cost divided by parking spaces equals $23,300 per spaces. Our direct construction costs divided by parking spaces equals $17,800 per space. We would anticipate replacing the garage in its entirety while maintaining rider access to this end of line station beneath it would greatly exceed these repair costs.

Two particular concerns during repair or replacement will be:

1. Pedestrian access to the station as all pedestrians must access the station by walking through this garage.

2. Preservation of the subterranean station which is located beneath this garage.

We believe these particular concerns will favor comprehensive repair of the garage rather than total replacement as we believe repair has less total impact.

LONG-TERM REPAIRS

Long term repairs are unlikely due to the anticipated extent of short-term repairs.

CONDITION ASSESSMENT

OBSERVATIONS AND DISCUSSION

The following observations were made during a facility walk through on the April 8 to 10, 2014 site visit. Photographs referenced within the observations are found in Appendix B of the report. Observations are immediately followed by a brief discussion of the repair in italics.

1. Roof level floor sealants are in poor condition and require replacement within 5 years. (Photos 4, 5, 8, 20, 24)
2. Interior floor sealants are in poor condition and require replacement within 5 years.
3. Roof level expansion joints are in poor condition and require replacement within 5 years. (Photos 6, 7, 9)
4. Interior level expansion joints are in poor condition and require replacement within 5 years.
5. Changes in floor elevation – curbs and wheel stops are not readily visually apparent and require painting now with safety yellow paint to emphasize elevations changes. (Photos 1, 2, 9)
6. Significant slab ceilling (soffit) leaching/delaminations was observed and loose concrete requires removal now.
7. Significant metal painted stair soffit rusting was observed and requires repainting. (Photo 25)
8. Floor slab soffits were observed to have extensive leaching cracks and extensive effloresence which require structural repair and waterproofing to address deterioration. (Photos 10, 12, 13, 15, 17, 18)
9. Many floor expansion joint blockouts were observed to have moderate cracking and spalling which require structural repair and waterproofing to address deterioration. (Photo 7)
10. Many columns/column haunch/walls were observed to be cracked/spalled which requires structural repair. (Photos 11, 14, 16, 21)
11. A moderate number of beams showed leaching, spalling and cracking which requires structural repair. (Photos 19, 23)
12. Many P/T tendons/anchors were observed to have indications of corrosion which requires structural repair and waterproofing now. (Photos 15, 17, 18)
13. A moderate amount of localized ponding was observed and new supplemental drains need to be installed. (Photos 1, 2, 3)
14. A few light poles showed evidence of rusting requiring repair or replacement. We understand these are currently scheduled for replacement. (Photo 22)
15. Through wall drains are leaking onto metal brackets causing them to rust and the brackets should be rebaled. (Photo 27)

MATERIAL TESTING

Concrete powder samples were extracted from floor surfaces of the roof and intermediate supported levels of the parking garage as shown in Appendix C. The chloride content was determined at 3 depths: near the surface (0-1 inch depth), near the design location for top reinforcing steel/tee connections (1 to 2 inch depth), and near the center of the slab (2 to 3 inch depth). Locations were taken in both cast-in-place concrete as well as precast concrete, if present, to determine the extent of chloride contamination in these differing concretes. The results are included in Appendix D. These chloride contents provide an indication of the current and expected future deterioration of the parking structure due to chloride-induced corrosion of the reinforcing steel. A typical threshold chloride value for the onset of corrosion is between 280 and 410 parts per million. The determined values are defined as minor (less than 200 ppm at the 1 to 2 inch depth), moderate (between 200 ppm and 400 ppm at the 1 to 2 inch depth, and large (greater than 400 ppm at the 1 to 2 inch depth. The extent of chloride contamination directly influences our recommended floor surface treatment (nothing, penetrating sealer, traffic topping).

The summary of chlorides test results in Appendix C are;

Level	Depth	Type	PPM
2	1 to 2	CIP	390
3 (Roof)	1 to 2	CIP	390

APPENDIX A

WALKER
RESTORATION CONSULTANTS

HUNTINGTON SOUTH GARAGE

Opinion of Probable Cost for Master Repair Plan
Recommended Phasing : 10 Year Program

	Work Item	Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Structural												
	106	P/T Slab Repair		$ 11,250,000								
	107	P/T Beam Repair		$ 206,908								
	108	P/T Column Repair		$ 129,405								
	109	Stair Tread Concrete Repair		$ 22,500								
	110	Epoxy Crack Injection										
	111	Masonry Repair										
	113	Repair Loose Bollard										
	115	Structural Repair Allowance @15% (min $1,000.00)		$ 1,741,322								
		Structural Sub-Total	**$ -**	**$ 13,350,134**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Waterproofing												
	201	Facade Sealant Replacement - P/T										
	203	Cove Sealant Replacement - P/T Roof										
	204	Cove Sealant Replacement - P/T Covered Levels										
	207	Floor Sealant Replacement - P/T Roof										
	208	Floor Sealant Replacement - P/T Covered Levels										
	211	Rout and Seal Cracks										
	212	Traffic Topping Repair										
	213	Traffic Topping - New Installation		$ 1,012,500								
	214	Concrete Sealer										
	215	Masonry Sealer										
	216	Expansion Joint Replacement - Roof										
	217	Expansion Joint Replacement - Covered Levels										
	218	Caulk Handrail Bases										
	221	Waterproofing Repair Allowance @ 10% (min $1,000.00)		$ 101,250								
		Waterproofing Sub-Total	**$ -**	**$ 1,113,750**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Mechanical												
	301	Repair Leaking Drainage Piping										
	302	New Drain & Piping										
	303	Repair Existing Trench Drains										
	305	Mechanical Allowance @ 10% (min $1,000.00)		$ 1,000								
		Mechanical Sub-Total	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Electrical												
	401	PARC System Replacement		$ 150,000								
	402	Remove & Reinstall Lighting		$ 180,000								
	403	Electrical Allowance @ 10% (min $1,000.00)		$ 33,000								
		Electrical Sub-Total	**$ -**	**$ 363,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Miscellaneous												
	501	Paint Curbs, Wheelstops and Islands Safety Yellow		$ 3,713								
	502	Repaint Traffic Markings		$ 16,875								
	503	Clean and Paint Metal Pan Stairs		$ 25,000								
	504	Repair Loose Stair Nosings										
	505	Replace Door, Frame and Hardware										
	506	Clean and Paint Door and Door Frame										
	507	Repaint Stair Railings										
	508	Railing Infill for Excessive Gap										
	509	Install Fencing under Lowest Stair Run										
	510	Replace Stair Tower Roof										
	511	Repair Broken Handrail										
		Miscellaneous Sub-Total	**$ -**	**$ 45,588**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
		Construction Subtotal	$ -	$ 14,873,472	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		Mobilization @ 6% of Construction Subtotal	$ -	$ 892,408	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		Construction Total	**$ -**	**$ 15,765,880**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
		Project Contingency @ 15%	$ -	$ 2,364,882	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		Engineering: Contract Documents/Field Rep @ 15%	$ -	$ 2,364,882	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		Material Testing During Construction	$ -	$ 157,659	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		Project Cost Totals Per Year:	**$ -**	**$ 20,653,303**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

NOTES:

1. Estimated costs are based on multi-year construction seasons.
2. Estimated costs are based on historical records of similar types of work.
   Costs may vary due to time of year, local economy, or other factors.
3. Costs assume no hazardous waste and a landfill located within 50 miles.
4. Cost based on normal work week, daylight hours and non-union labor.

APPENDIX B

WALKER
RESTORATION CONSULTANTS

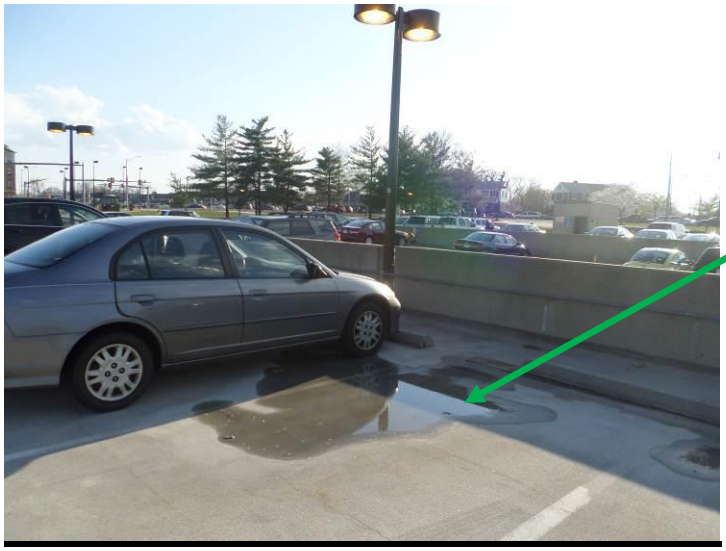


Photo 1

Top level ponding.

Photo 2

Top level ponding.

Photo 3

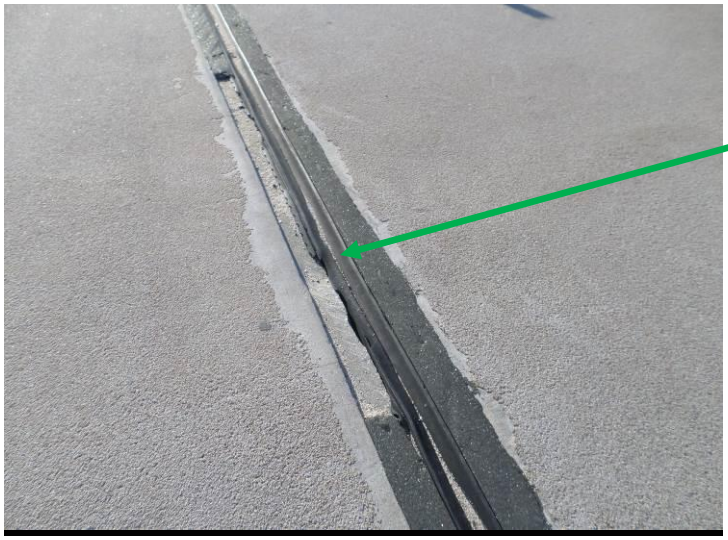
Ponding on stair landing. Black stair nosings provide color contrast so no yellow paint is recommended.

Delaminated traffic topping over spalled concrete.

Photo 4

Spalling.

Photo 5



Damaged expansion joint.

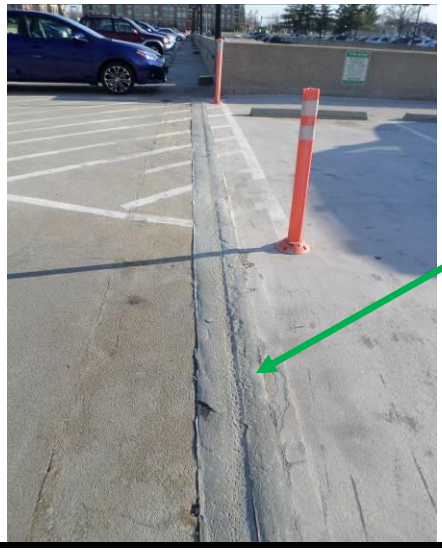
Photo 6

Deteriorated expansion joint topping.

Photo 7

Deteriorated cove sealant.

Photo 8



Deteriorated expansion joint.

Photo 9

Slab soffit spalling at construction joint.

Photo 10

Corbel leaching and spalling at rusting reinforcing.

Photo 11

Spalling and exposed reinforcing adjacent expansion joint.

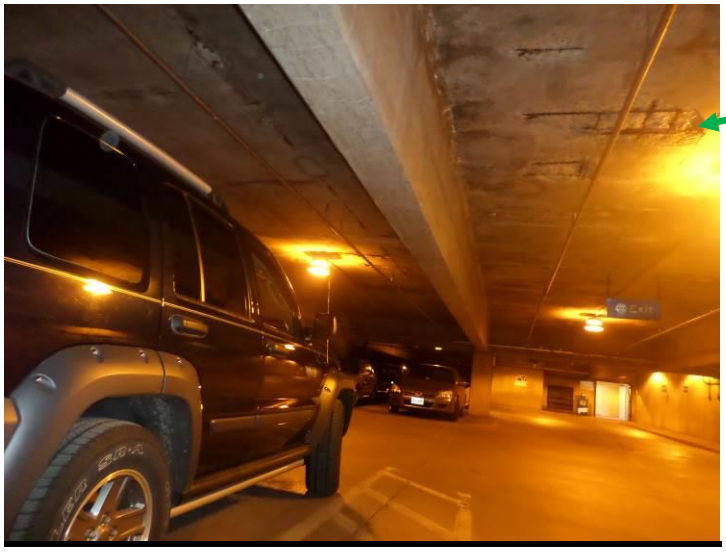
Photo 12

Leaking and soffit spalling in adjacent station.

Photo 13

Leaching and cracking on exterior.

Photo 14



Spalling with exposed reinforcing and P/T tendons.

Photo 15

Photo 16

Spalling and exposed reinforcing in adjacent station.

Photo 17

Spalling with exposed reinforcing and P/T tendons.

Photo 18

Spalling with exposed reinforcing and P/T tendons.

Spalling and leaching on beam.

Photo 19

Floor delamination.

Photo 20

Spalling with exposed reinforcing on column.

Photo 21

Rusted metal light pole.

Photo 22

Cracking in perimeter beam.

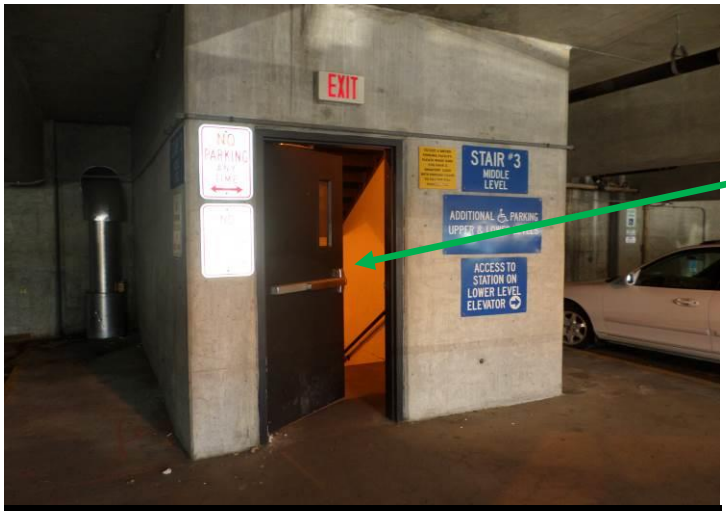
Photo 23

Spalling slab and damaged traffic topping.

Photo 24

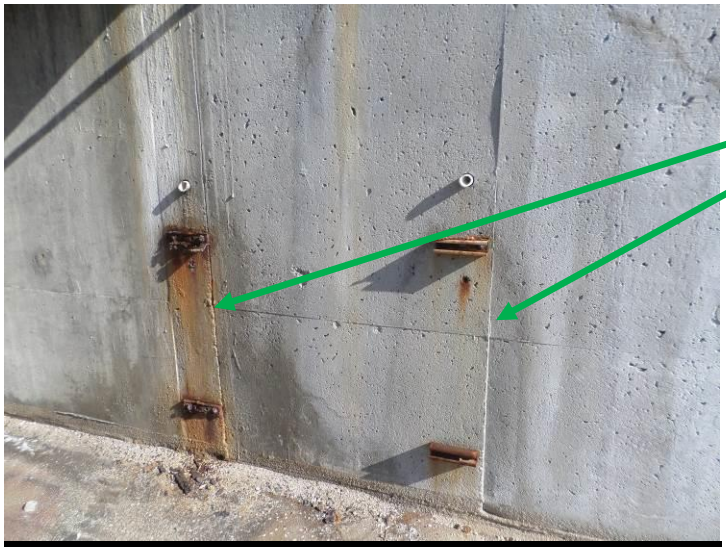
Rusting on underside of stairs.

Photo 25



Broken panic hardware.

Photo 26



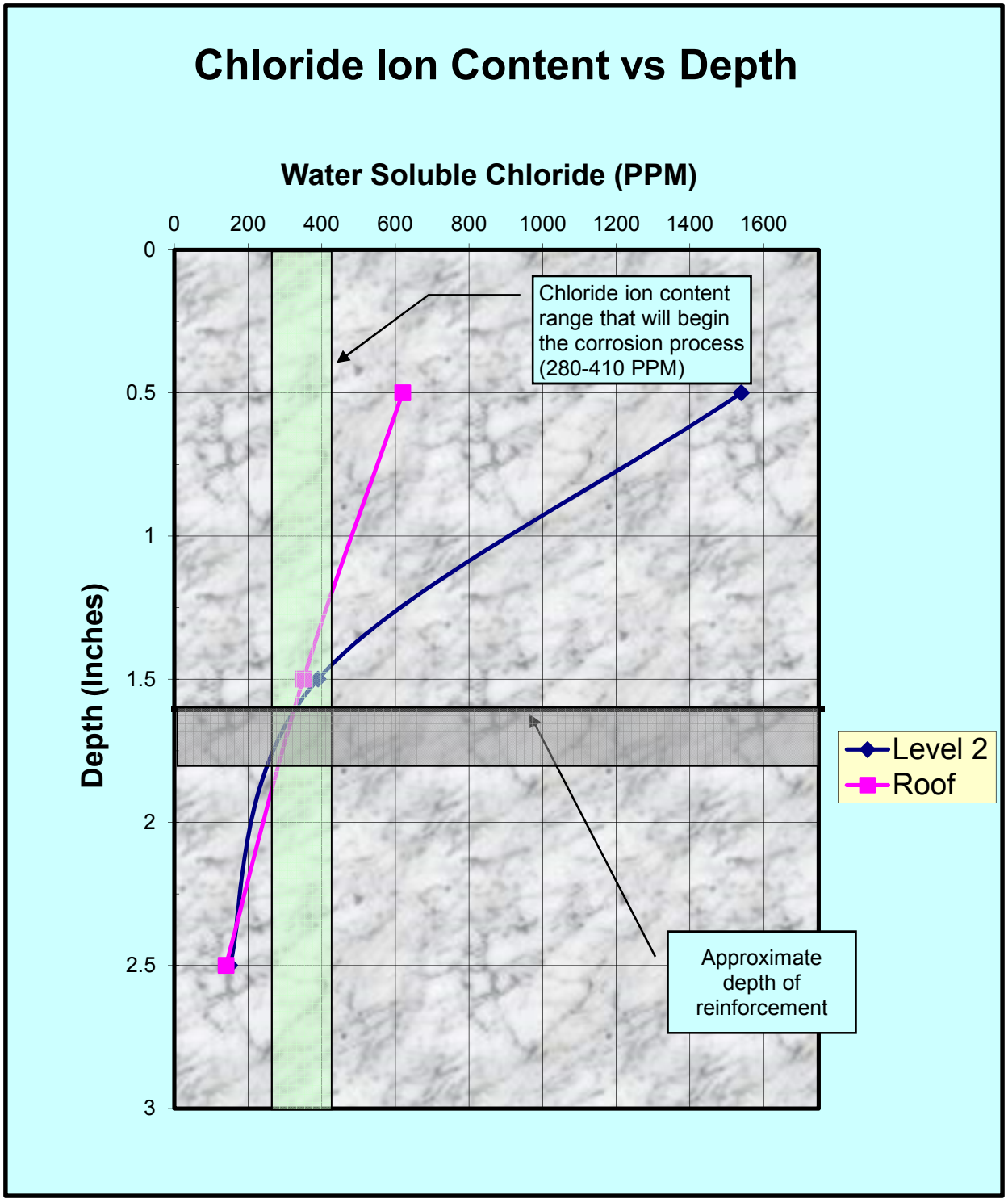
Rusted metal brackets beneath thru-wall drains.

Photo 27

APPENDIX C

WALKER
RESTORATION CONSULTANTS

Project # 14-3944.04
Date Jun-14



UNIVERSAL CONSTRUCTION TESTING, Ltd.

Project: Washington Metropolitan Area Transit Authority
Maryland, Virginia & Washington DC

UCT Project No. 14073
Walker Project No. 14-3994.04

Client: Walker Restoration Consultants

Date: May 2, 2014

Table 1.9. **Chloride Content of Concrete**
(Water-Soluble)
AASHTO T 260

Sample Number	Location in Structure	Level tested, inch from top	Chloride ion (CL^-) Content		
			by weight of concrete %	by weight of cement* %	by weight of concrete (ppm)*
Huntington South Garage					
Top	-	0-1	0.062	**0.39**	620
		1-2	0.035	**0.23**	350
		2-3	0.014	**0.09**	140
2	Level 2	0-1	0.154	**0.97**	1540
	Intermediate Level	1-2	0.039	**0.24**	390
		2-3	0.015	**0.10**	150

Remarks: *) Assumed cement content 600 lbs/cu.yd. and U.W. = 3800 pcy.

APPENDIX D

WALKER
RESTORATION CONSULTANTS

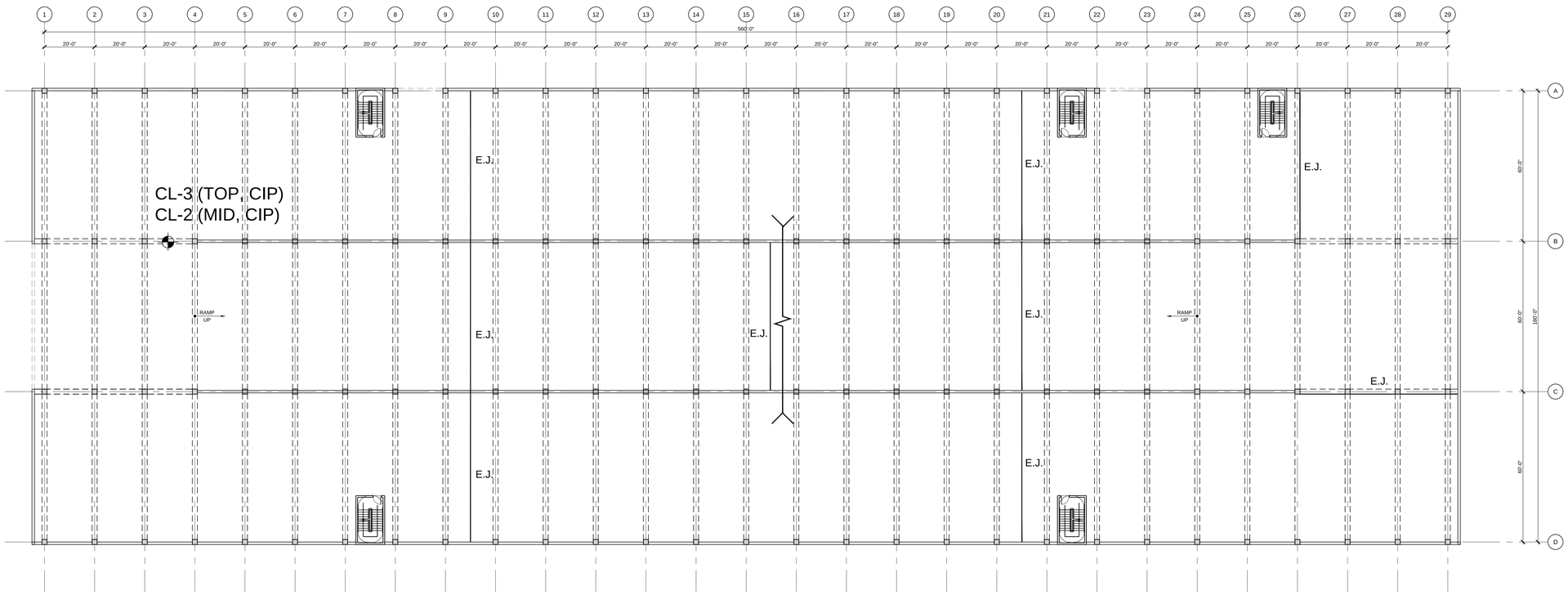
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY - HUNTINGTON SOUTH GARAGE

ALEXANDRIA, VIRGINIA

WALKER PARKING CONSULTANTS

CHLORIDES

SAMPLE LOCATIONS



LEGEND:

CL-1 CONCRETE SAMPLE
THE FIRST NUMBER REFERS TO THE SAMPLE NUMBER. THE SECOND NUMBER REFERS TO THE FLOOR WHERE THE SAMPLE WAS TAKEN. THE FINAL SYMBOL (P/C = PRECAST, CIP = CAST IN PLACE) REFERS TO THE TYPE OF CONCRETE FROM WHICH THE SAMPLE WAS TAKEN. TAKEN 4/9/2014

LEGEND

NORTH

Scale: 1" = 20' - 0"

R-701

04/03/2014 14-944.00

APPENDIX E

WALKER
RESTORATION CONSULTANTS

Kletsko, Marissa

From: Neiderer, Greg
Sent: Wednesday, April 16, 2014 3:35 PM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Stairs, Kathryn; Gross, Jason @ Walker
Subject: 2014 04 16 WMATA Huntington South Urgent Actions - Floor and Ceiling Spall Abaotemnt, Investigation

Patrick,

We reviewed this garage on 4/9, 4/10 and we found the slab to be in poor shape with floor spalls and ceiling spalls too numerous to identify. We recommend you promptly hire a contractor to remove all the ceiling spalls and fill the floor spalls. This will be, in our opinion a significant effort of several weeks.

We also recommend you proceed this year with an in-depth study to determine the appropriate long term actions necessary to maintain this asset.

Sincerely,

Gregory J. Neiderer, PE
Principal

Walker Restoration Consultants | Walker Parking Consultants
565 East Swedesford Road, Suite 300 | Wayne, PA 19087
610.995.0260 x 1408 (Office) | 610.659.6967 (Cell) | 610.995.0261 (Fax) www.walkerrestoration.com | www.walkerparking.com

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LARGO NORTH

WALKER
RESTORATION CONSULTANTS

WALKER RESTORATION CONSULTANTS

FEBRUARY 2015 14-3944.04

The summary data for the facility is as follows:

Table LARGN-1: Facility Information Summary

	LARGO NORTH
Location:	701 North Harry S. Truman Dr. Upper Marlboro, MD 20774
Overall Condition:	**FAIR**
Current Needs:	**MODERATE**
Chloride Contamination	**LARGE**
Year built:	2004
Supported Levels	5
Levels Below Grade	None
Parking Space Capacity:	North + South = 2,200
Parking Efficiency:	North + South 243 SF/Space
Footprint:	Approximately 386' x 121'
Bridges:	Yes, but included in Largo South Data
Vehicle Circulation:	Single Helix
Pedestrian Circulation	2 Stair(s), 2 Elevator(s)
Parking Area: Slab on Grade Total Supported Area Total Parking Area	 31,000 ± SF 230,000 ± SF 262,000 ± SF
Structural System	Precast Field-topped Double Tee
Façade Spandrel Treatment	Precast with Thin Brick Tile

FACILITY DESCRIPTION

NORTH VIEW

SOUTH VIEW

EAST VIEW

WEST VIEW

PLAN VIEW- SMALLER GARAGE IS LARGO NORTH

FEBRUARY 2015 14-3944.04

EXECUTIVE SUMMARY

This 2004 garage is in fair shape, has significant chloride contamination and has moderate current repair needs. This garage is directly connected to the Largo South garage via a roof level vehicular bridge over the Metro tracks. The bridge is included in the Largo South report.

Its scheduled repairs are anticipated to cost:

2020 – Near Term - $750,640
2022 – Long-term - $102,869

See Appendix A for cost details.

CRITICAL REPAIRS

The following safety related items requiring urgent action were identified in our 5/22/14 email to Metro:

1. Overhead spalls
2. Stair tread spalls
3. Unpainted curbs (trip hazard)

Please see the above reference email, found in Appendix E, for more detail and recommended actions. We have no further immediate concerns.

NEAR-TERM REPAIRS

Due to the age and condition of the garage we recommend most of the non-critical repairs be completed in 2020, year five of the master repair plan. These near-term repairs include addressing the structural items found including:

1. Remove and replace spalled overhead concrete found on ceilings (soffits) and beams with repair concrete anchored with supplementary embedded steel pins. Monitor this condition at least every 6 months until replacement and remove loose concrete.
2. Remove and replace stair tread and landing spalled concrete with repair concrete.

RECOMMENDATIONS

3. Repair or replace roof level bridge expansion joint glands
4. Repaint curbs
5. Repaint traffic markings

Based on chloride test results, we recommend the following improvements to protect the floor structural system:

1. Install penetrating sealer at all supported levels
2. Install traffic topping at all cast-in-place washes on the interior

LONG-TERM REPAIRS

Long term repairs include a second round of structural and waterproofing repairs in 2022, two years after the near-term repairs to address continued deterioration of the concrete and the end of the useful life of the waterproofing products. Long-term repairs items include the following:

1. Replace roof level floor sealants

OBSERVATIONS AND DISCUSSION

CONDITION ASSESSMENT

The following observations were made during a facility walk through on the May 19 to 20, 2014 site visit. Photographs referenced within the observations are found in Appendix B of the report. Observations are immediately followed by a brief discussion of the repair in italics.

1. Roof level floor sealants are in good condition and require replacement within 10 years. (Photo 1)
2. Interior floor sealants are in good condition and require replacement beyond 10 years.
3. Roof level expansion joints are in fair condition and require replacement within 5 years. (Photo 1)
4. Interior level expansion joints are in good condition and require replacement beyond 10 years.
5. Changes in floor elevation- curbs, handicap ramps, steps and stair tread nosings, are not readily visually apparent and require painting now with safety yellow paint to emphasize elevations changes (Photo 2)
6. Minor beam soffit delaminations were observed and

loose concrete requires removal now. (Photo 3,4)

7. Stair treads and landings were observed to have spalls which require repair now to eliminate trip hazards. (Photo 6,7,8,9)
8. A minor amount of the concrete adjacent to double tee to double tee welded connections was observed to be cracked and spalling which requires structural repair. (Photo 5)

MATERIAL TESTING

Concrete powder samples were extracted from floor surfaces of the roof and intermediate supported levels of the parking garage as shown in Appendix C. The chloride content was determined at 3 depths: near the surface (0-1 inch depth), near the design location for top reinforcing steel/tee connections (1 to 2 inch depth), and near the center of the slab (2 to 3 inch depth). Locations were taken in both cast-in-place concrete as well as precast concrete, if present, to determine the extent of chloride contamination in these differing concretes. The results are included in Appendix D. These chloride contents provide an indication of the current and expected future deterioration of the parking structure due to chloride-induced corrosion of the reinforcing steel. A typical threshold chloride value for the onset of corrosion is between 280 and 410 parts per million. The determined values are defined as minor (less than 200 ppm at the 1 to 2 inch depth), moderate (between 200 ppm and 400 ppm at the 1 to 2 inch depth, and large (greater than 400 ppm at the 1 to 2 inch depth. The extent of chloride contamination directly influences our recommended floor surface treatment (nothing, penetrating sealer, traffic topping).

The summary of chlorides test results in Appendix C are;

Level	Depth	Type	PPM
2	1 to 2	P/C	160
3	1 to 2	CIP	250
4	1 to 2	CIP	430
5	1 to 2	P/C	530
6 (Roof)	1 to 2	CIP	500

APPENDIX A

WALKER
RESTORATION CONSULTANTS

LARGO NORTH GARAGE

Opinion of Probable Cost for Master Repair Plan
Recommended Phasing : 10 Year Program

	Work Item	Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Structural												
	101	Precast Slab Repair	$ 7,905				$ 71,143					
	102	Precast Tee Stem Repair					$ 5,415					
	103	Precast Beam Repair					$ 3,417					
	104	Precast Shear Connector Repair					$ 7,110					
	105	Precast Column/Wall Repair					$ 2,805					
	109	Stair Tread Concrete Repair	$ 1,500									
	110	Epoxy Crack Injection										
	111	Masonry Repair										
	112	Replace Double Tee Bearing Pad										
	113	Repair Loose Bollard										
	115	Structural Repair Allowance @15% (min $1,000.00)	$ 1,411				$ 13,483		$ 1,000			
		Structural Sub-Total	**$ 10,816**	**$ -**	**$ -**	**$ -**	**$ 103,373**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Waterproofing												
	202	Façade Sealant Replacement - Precast										
	205	Cove Sealant Replacement - Precast Roof							$ 13,870			
	206	Cove Sealant Replacement - Precast Covered Levels										
	209	Floor Sealant Replacement - Precast Roof							$ 50,749			
	210	Floor Sealant Replacement - Precast Covered Levels										
	211	Rout and Seal Cracks										
	212	Traffic Topping Repair										
	213	Traffic Topping - New Installation					$ 151,875					
	214	Concrete Sealer					$ 203,000					
	215	Masonry Sealer										
	216	Expansion Joint Replacement - Roof					$ 25,875					
	217	Expansion Joint Replacement - Covered Levels										
	218	Caulk Handrail Bases										
	221	Waterproofing Repair Allowance @ 10% (min $1,000.00)	$ 1,000				$ 38,075		$ 6,462			
		Waterproofing Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ 418,825**	**$ -**	**$ 71,081**	**$ -**	**$ -**	**$ -**
Mechanical												
	301	Repair Leaking Drainage Piping										
	302	New Drain & Piping										
	303	Repair Existing Trench Drains										
	305	Mechanical Allowance @ 10% (min $1,000.00)	$ 1,000				$ 1,000		$ 1,000			
		Mechanical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Electrical												
	401	PARC System Replacement						$ 150,000				
	403	Electrical Allowance @ 10% (min $1,000.00)	$ 1,000				$ 1,000	$ 15,000	$ 1,000			
		Electrical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ 165,000**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Miscellaneous												
	501	Paint Curbs, Wheelstops and Islands Safety Yellow	$ 3,603									
	502	Repaint Traffic Markings					$ 16,375					
	503	Clean and Paint Metal Pan Stairs										
	504	Repair Loose Stair Nosings										
	505	Replace Door, Frame and Hardware										
	506	Clean and Paint Door and Door Frame										
	507	Repaint Stair Railings										
	508	Railing Infill for Excessive Gap										
	509	Install Fencing under Lowest Stair Run										
	510	Replace Stair Tower Roof										
	511	Repair Broken Handrail										
		Miscellaneous Sub-Total	**$ 3,603**	**$ -**	**$ -**	**$ -**	**$ 16,375**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
		Construction Subtotal	$ 17,418	$ -	$ -	$ -	$ 540,573	$ 165,000	$ 74,081	$ -	$ -	$ -
		Mobilization @ 6% of Construction Subtotal	$ 1,045	$ -	$ -	$ -	$ 32,434	$ 9,900	$ 4,445	$ -	$ -	$ -
		Construction Total	**$ 18,463**	**$ -**	**$ -**	**$ -**	**$ 573,007**	**$ 174,900**	**$ 78,526**	**$ -**	**$ -**	**$ -**
		Project Contingency @ 15%	$ 2,769	$ -	$ -	$ -	$ 85,951	$ 26,235	$ 11,779	$ -	$ -	$ -
		Engineering: Contract Documents/Field Rep @ 15%	$ 2,769	$ -	$ -	$ -	$ 85,951	$ 26,235	$ 11,779	$ -	$ -	$ -
		Material Testing During Construction	$ 185	$ -	$ -	$ -	$ 5,730	$ 1,749	$ 785	$ -	$ -	$ -
		Project Cost Totals Per Year:	**$ 24,187**	**$ -**	**$ -**	**$ -**	**$ 750,640**	**$ 229,119**	**$ 102,869**	**$ -**	**$ -**	**$ -**

NOTES:

1. Estimated costs are based on multi-year construction seasons.
2. Estimated costs are based on historical records of similar types of work.
   Costs may vary due to time of year, local economy, or other factors.
3. Costs assume no hazardous waste and a landfill located within 50 miles.
4. Cost based on normal work week, daylight hours and non-union labor.

APPENDIX B

WALKER
RESTORATION CONSULTANTS

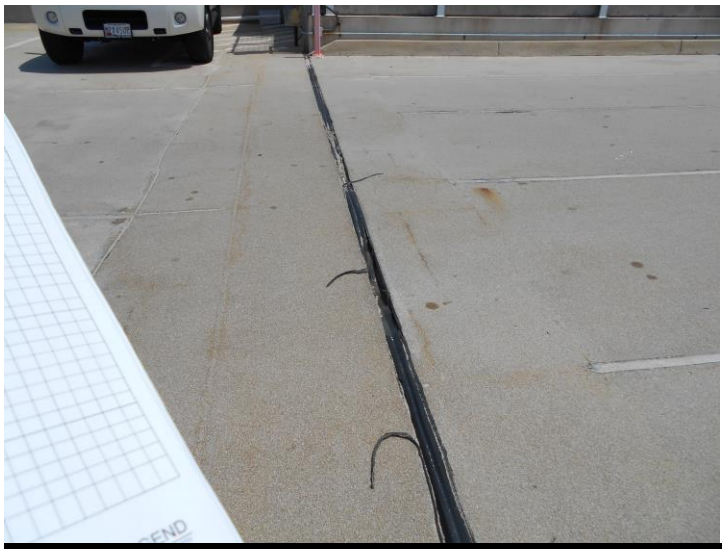


Photo 1

Damaged roof level expansion joint.

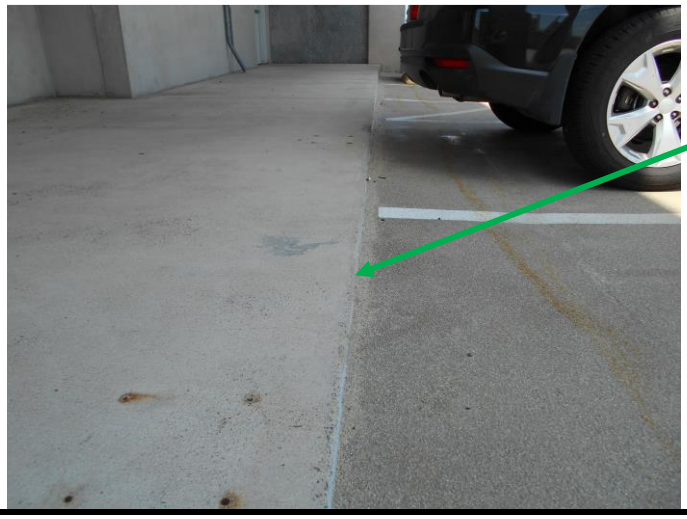


Photo 2

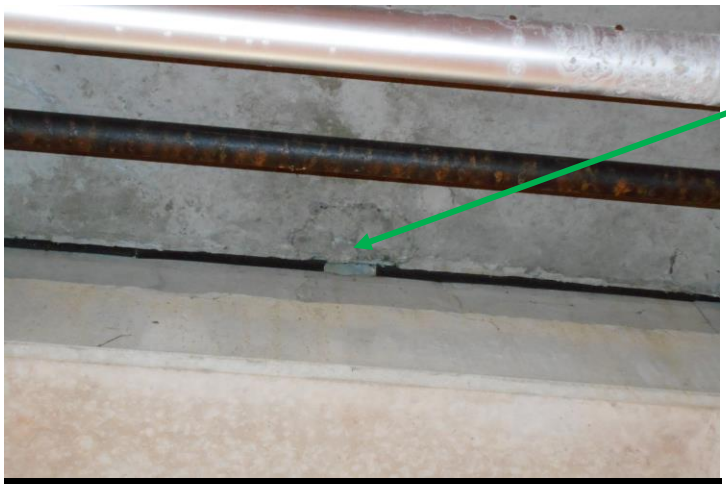
Curb not painted.

Photo 3

Spalled inverted tee beam with exposed reinforcing.

Spalled inverted tee beam with exposed reinforcing.

Photo 4

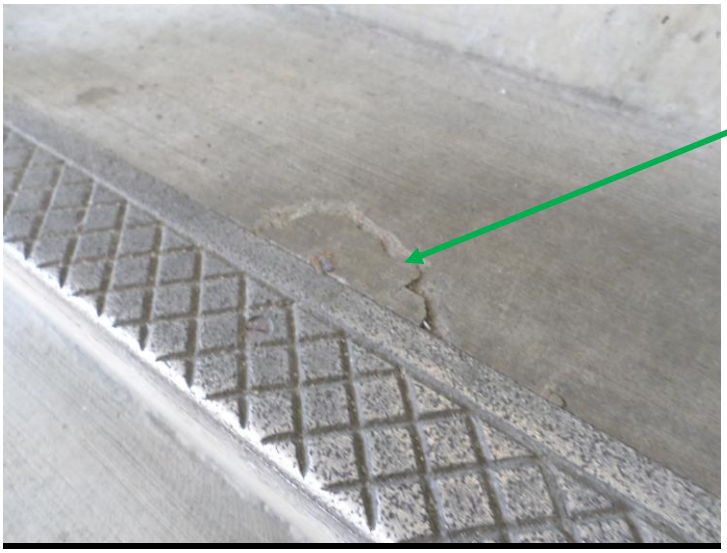


Spall at underside of welded connection

Photo 5

Stairs in fair condition. Black stair nosings provide color contrast so no yellow paint is recommended.

Photo 6



Stair nosing spall.

Photo 7

Stair nosing spall.

Photo 8

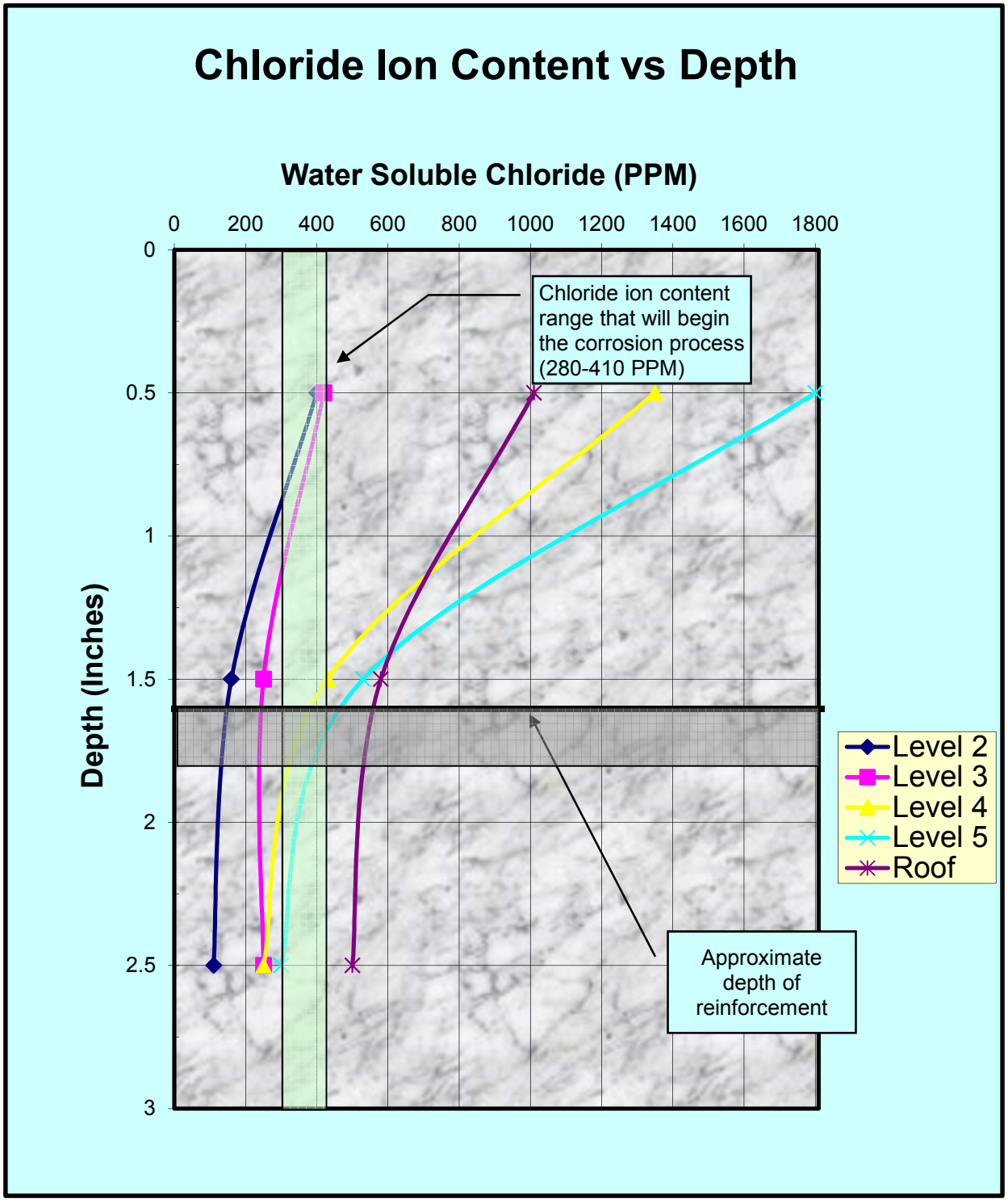
Stair landing spall at connection.

Photo 9

APPENDIX C

WALKER
RESTORATION CONSULTANTS

Project # 14-3944.04
Date Jun-14



UNIVERSAL CONSTRUCTION TESTING, Ltd.

Project: Washington Metropolitan Area Transit Authority
Maryland, Virginia & Washington DC

UCT Project No. 14084
Walker Project No. 14-3994.00

Client: Walker Restoration Consultants

Date: May 12, 2014

Table 1.3. **Chloride Content of Concrete**
(Water-Soluble)
AASHTO T 260

Sample Number	Location in Structure	Level tested, inch from top	Chloride ion (CL^-) Content		
			by weight of concrete %	by weight of cement* %	by weight of concrete (ppm)*
Largo North Garage					
2	Level 2	0-1	0.040	**0.25**	400
	Intermediate	1-2	0.016	**0.10**	160
		2-3	0.011	**0.07**	110
3	Level 3	0-1	0.042	**0.27**	420
	Intermediate	1-2	0.025	**0.16**	250
		2-3	0.025	**0.16**	250
4	Level 4	0-1	0.135	**0.85**	1350
	Intermediate	1-2	0.043	**0.28**	430
		2-3	0.025	**0.16**	250
5	Level 5	0-1	0.180	**1.14**	1800
	Intermediate	1-2	0.053	**0.33**	530
		2-3	0.030	**0.19**	300
6	Level 6	0-1	0.101	**0.64**	1010
	Roof	1-2	0.058	**0.37**	580
		2-3	0.050	**0.32**	500

Remarks: *) Assumed cement content 600 lbs/cu.yd. and U.W. = 3800 pcy.

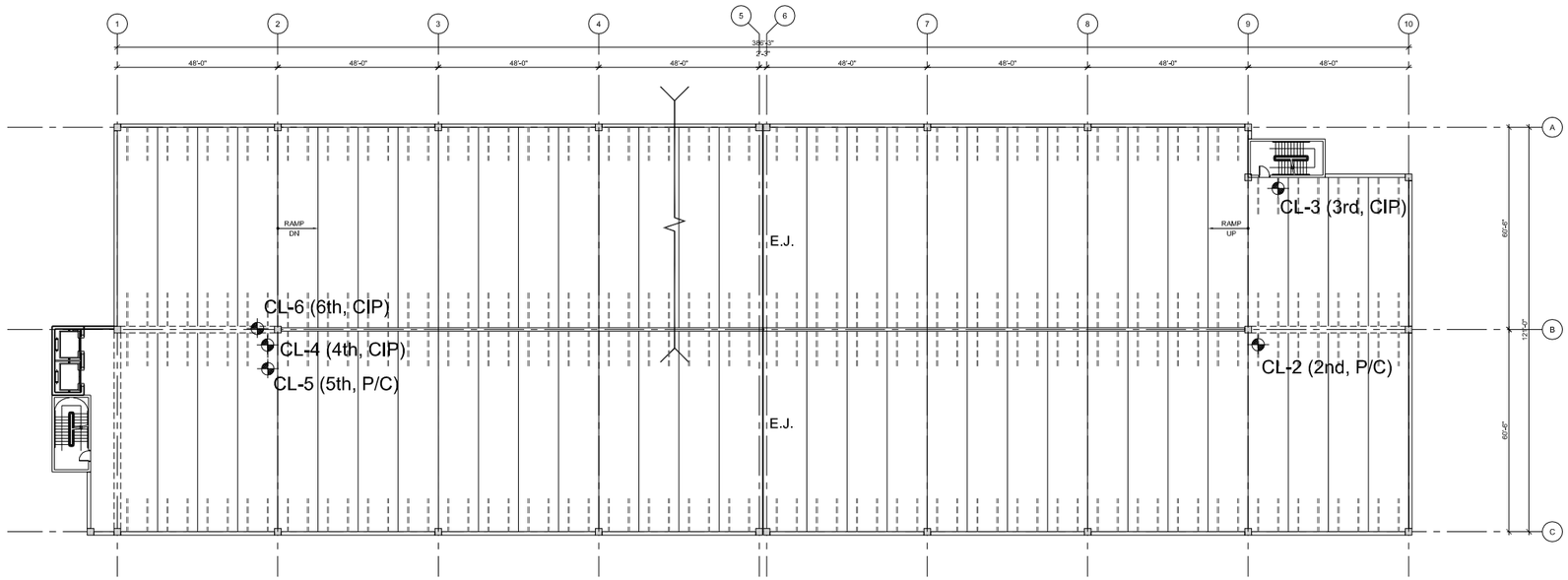
UNIVERSAL CONSTRUCTION TESTING

APPENDIX D

WALKER
RESTORATION CONSULTANTS

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY - LARGO NORTH GARAGE
UPPER MARLBORO, MARYLAND

WALKER PARKING CONSULTANTS



CHLORIDES
SAMPLE LOCATIONS

LEGEND:

CL-1 CONCRETE SAMPLE
THE FIRST NUMBER REFERS TO THE SAMPLE NUMBER. THE SECOND NUMBER REFERS TO THE FLOOR WHERE THE SAMPLE WAS TAKEN. THE FINAL SYMBOL (P/C = PRECAST, CIP = CAST IN PLACE) REFERS TO THE TYPE OF CONCRETE FROM WHICH THE SAMPLE WAS TAKEN. TAKEN 4/14/2014

LEGEND

NORTH

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

R-701

04/03/2014 14-944.00

APPENDIX E

WALKER
RESTORATION CONSULTANTS

Kletsko, Marissa

From: Neiderer, Greg
Sent: Thursday, May 22, 2014 1:01 PM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Gross, Jason @ Walker; Stairs, Kathryn
Subject: 2014 05 22 WMATA Largo North & South Near Term Actions
Attachments: SAM_1576.jpg; SAM_1553.jpg; SAM_1555.jpg; SAM_1572.jpg; DSCN0530.jpg; DSCN0522.jpg; DSCN0528.jpg; DSCN0536.jpg; DSCN0534.jpg; DSCN0537.jpg

Patrick,

We reviewed these garages on 5/19 and we found the following items in need of action:

South:

1. There is a 1 s.f. spall on the exterior of the spandrel on the second tier, C.L. E-7.
2. The expansion joint nosing is damaged and could pose a trip hazard on level 2 between C.L. C and D. See photo 1553.
3. There is spalled overhead concrete near the shearwall at C.L. D-4, soffit of Level 3. See photo 1555.
4. There are small (<1 s.f.) spalls on the exterior of roof level spandrels at C.L. E-10 and A-5. See photo 1572 for E-10.
5. There is loose overhead concrete near C.L. E-9, roof level soffit.
6. There are multiple loose overhead small spalls throughout the soffit of all levels.
7. There is damaged fencing along grid B between grids 7-8 on the top tier. Photo 522
8. There is loose wood forms adjacent to a column in front of the main stair/elevator tower on soffit of levels 2 and 3. Photo 528
9. There is a curb that varies in height in front of the main stair/elevator tower that is not painted.
10. There is an exposed cable in the slab of level 2 along the Inverted T beam grid B between 9-10. Photo 530

North:

11. Numerous small (<1 s.f.) spalls on stair treads, multiple levels, main stair. See photo 1576.
12. Failing/torn expansion joint at bridge connection top tier. Photo 532
13. There is a curb that varies in height in front of the main stair/elevator tower that is not painted. Photo 534
14. There is overhead soffit spalls on underside of inverted tee beam grid B between grids 1-2 top tier. Photo 536
15. There are multiple loose overhead small spalls throughout the soffit of all levels. Photo 537

Please address the soffit and wall spalls by removal, fill the floor spalls and exposed cables to remove tripping hazards, paint the curbs and address damaged fencing and masonry.

Gregory J. Neiderer, PE
Principal

Walker Restoration Consultants | Walker Parking Consultants
565 East Swedesford Road, Suite 300 | Wayne, PA 19087
610.995.0260 x 1408 (Office) | 610.659.6967 (Cell) | 610.995.0261 (Fax)

www.walkerrestoration.com | www.walkerparking.com

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Thanks,

Kathryn E. Stairs, P.E.
Project Manager

Walker Restoration Consultants | Walker Parking Consultants
565 East Swedesford Road, Suite 300 | Wayne, PA 19087
610.995.0260 x 1405 (Office) | 610.662.8854 (Cell) | 610.995.0261 (Fax)
www.walkerrestoration.com | www.walkerparking.com









LARGO SOUTH

WALKER
RESTORATION CONSULTANTS

FEBRUARY 2015 14-3944.04

The summary data for the facility is as follows:

Table LARGS-1: Facility Information Summary

	LARGO SOUTH
Location:	Grand Boulevard & Lottsford Road Largo, MD 20774
Overall Condition:	**FAIR**
Current Needs:	**MINOR**
Chloride Contamination	**MODERATE**
Year built:	2004
Supported Levels	4
Levels Below Grade	None
Parking Space Capacity:	North + South = 2,200
Parking Efficiency:	North + South 243 SF/Space
Footprint:	Approximately 360' x 240'
Bridges:	1 Vehicular
Vehicle Circulation:	Double Helix
Pedestrian Circulation	3 Stair(s), 2 Elevator(s)
Parking Area: Slab on Grade Total Supported Area Total Parking Area	 76,000 ± SF 198,000 ± SF 274,000 ± SF
Structural System	Precast Un-topped Double Tee
Façade Spandrel Treatment	Precast with Thin Brick Tile

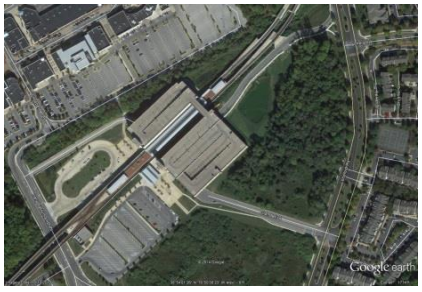
FACILITY DESCRIPTION


NORTH VIEW


SOUTH VIEW


EAST VIEW


WEST VIEW



PLAN- LARGE GARAGE IS SOUTH

FEBRUARY 2015 14-3944.04

EXECUTIVE SUMMARY

This 2004 garage is in fair shape, has moderate chloride contamination and has minor current repair needs. This garage is directly connected to the Largo North garage via a roof level vehicular bridge over the Metro tracks. The bridge is included in this report.

Its scheduled repairs are anticipated to cost:

2019 – Near Term - $719,668
2024 – Long-term - $193,343

See Appendix A for cost details.

CRITICAL REPAIRS

The following safety related items requiring urgent action were identified in our 05/22/14 email to Metro:

1. Overhead spalls
2. Overhead work formwork
3. Stair tread spalls
4. Broken double tee flange corners
5. Unpainted curbs (trip hazard)
6. Failing bridge expansion joint
7. Damaged fencing
8. Exposed floor lifting lug cable (trip hazard)

Please see the above reference email, found in Appendix E, for more detail and recommended actions. We have no further immediate concerns.

NEAR-TERM REPAIRS

Due to the age and condition of the garage we recommend most of the non-critical repairs be completed in 2019, year four of the master repair plan. These near-term repairs include addressing the structural items found including:

1. Remove and replace spalled overhead concrete found on ceilings (soffits), bridges, beams and walls with repair concrete anchored with supplementary

RECOMMENDATIONS

embedded steel pins. Monitor this condition at least every 6 months until replacement and remove loose concrete.
2. Remove and replace stair tread and landing spalled concrete with repair concrete.
3. Re-anchor loose stair tread nosings
4. Reweld double tee floor connections
5. Replace roof level floor sealants
6. Replace roof level expansion joint glands
7. Install new supplemental floor piping
8. Replace stairtower door and frame
9. Repair fencing
10. Complete ASR investigation

Based on chloride test results, we recommend the following improvements to protect the floor structural system:

1. Install penetrating sealer at the lowest supported level

LONG-TERM REPAIRS

Long term repairs include a second round of structural and waterproofing repairs in 2024, five years after the near-term repairs to address continued deterioration of the concrete and the end of the useful life of the waterproofing products. Long-term repairs items include the following:

1. Replace interior level floor sealants
2. Replace interior level expansion joint glands

OBSERVATIONS AND DISCUSSION

CONDITION ASSESSMENT

The following observations were made during a facility walk through on the May 19 to 20, 2014 site visit. Photographs referenced within the observations are found in Appendix B of the report. Observations are immediately followed by a brief discussion of the repair in italics.

1. Roof level floor sealants are in fair condition and require replacement within 5 years. (Photo 2)
2. Interior floor sealants are in good condition and require replacement within 10 years.
3. Roof level expansion joints are in fair condition and require replacement within 5 years. (Photo 6)
4. Interior level expansion joints are in fair condition and require replacement within 10 years. (Photo 5)

5. Significant slab ceilling (soffit) leaching/delaminations were observed and loose concrete requires removal now. (Photo 9)
6. Stair treads and landings were observed to have loose nosings and spalls which require repair now to eliminate trip hazards. (Photo 4, 10, 11, 12)
7. Bridge slab soffits were observed to have moderate leaching cracks and moderate effloresence which require structural repair and waterproofing to address deterioration now. (Photo 3)
8. Floor expansion joint shear transfer devices were observed to be in good condition (Photo 7)
9. A minor number of the double tee to double tee welded connections were observed to be rusting which requires structural repair.
10. A minor amount of the concrete adjacent to double tee to shear wall welded connections was observed to be cracked and spalling which requires structural repair.
11. A few columns and walls were observed to be cracked/spalled which requires structural repair, as well as ASR investigation. (Photo 16, 17, 18)
12. The stairtower doors are corroded, damaged, and missing hardware which requires replacement (Photo 14, 15).
13. The fencing is damaged and require repair now. (Photo 8).
14. A minor amount of localized ponding was observed and supplemental drains need to be installed on stair landings. (Photo 13)

MATERIAL TESTING

Concrete powder samples were extracted from floor surfaces of the roof and intermediate supported levels of the parking garage as shown in Appendix C. The chloride content was determined at 3 depths: near the surface (0-1 inch depth), near the design location for top reinforcing steel/tee connections (1 to 2 inch depth), and near the center of the slab (2 to 3 inch depth). Locations were taken in both cast-in-place concrete as well as precast concrete, if present, to determine the extent of chloride contamination in these differing concretes. The results are included in Appendix D. These chloride contents provide an indication of the current and expected future deterioration of the

parking structure due to chloride-induced corrosion of the reinforcing steel. A typical threshold chloride value for the onset of corrosion is between 280 and 410 parts per million. The determined values are defined as minor (less than 200 ppm at the 1 to 2 inch depth), moderate (between 200 ppm and 400 ppm at the 1 to 2 inch depth, and large (greater than 400 ppm at the 1 to 2 inch depth. The extent of chloride contamination directly influences our recommended floor surface treatment (nothing, penetrating sealer, traffic topping).

The summary of chlorides test results in Appendix C are:

Level	Depth	Type	PPM
1	1 to 2	P/C	430
2	1 to 2	CIP	170
3	1 to 2	P/C	110
4	1 to 2	CIP	50

APPENDIX A

WALKER
RESTORATION CONSULTANTS

LARGO SOUTH GARAGE

Opinion of Probable Cost for Master Repair Plan
Recommended Phasing : 10 Year Program

	Work Item	Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Structural												
	101	Precast Slab Repair	$ 14,479			$ 43,436						
	102	Precast Tee Stem Repair				$ 3,967						
	103	Precast Beam Repair				$ 2,503						
	104	Precast Shear Connector Repair				$ 5,209						
	105	Precast Column/Wall Repair				$ 2,055						
	109	Stair Tread Concrete Repair	$ 750									
	110	Epoxy Crack Injection										
	111	Masonry Repair										
	112	Replace Double Tee Bearing Pad										
	113	Repair Loose Bollard										
	115	Structural Repair Allowance @15% (min $1,000.00)	$ 2,284			$ 8,576					$ 1,000	
		Structural Sub-Total	**$ 17,513**	**$ -**	**$ -**	**$ 65,746**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**
Waterproofing												
	202	Façade Sealant Replacement - Precast										
	205	Cove Sealant Replacement - Precast Roof				$ 28,032						
	206	Cove Sealant Replacement - Precast Covered Levels									$ 24,611	
	209	Floor Sealant Replacement - Precast Roof				$ 102,569						
	210	Floor Sealant Replacement - Precast Covered Levels									$ 99,240	
	211	Rout and Seal Cracks										
	212	Traffic Topping Repair										
	213	Traffic Topping - New Installation										
	214	Concrete Sealer				$ 76,000						
	215	Masonry Sealer										
	216	Expansion Joint Replacement - Roof	$ 4,317			$ 34,927						
	217	Expansion Joint Replacement - Covered Levels				$ 122,044						
	218	Caulk Handrail Bases										
	221	Waterproofing Repair Allowance @ 10% (min $1,000.00)	$ 1,000			$ 36,357					$ 12,385	
		Waterproofing Sub-Total	**$ 5,317**	**$ -**	**$ -**	**$ 399,929**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 136,236**	**$ -**
Mechanical												
	301	Repair Leaking Drainage Piping										
	302	New Drain & Piping				$ 2,406						
	303	Repair Existing Trench Drains										
	305	Mechanical Allowance @ 10% (min $1,000.00)	$ 1,000			$ 1,000					$ 1,000	
		Mechanical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ 3,406**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**
Electrical												
	401	PARC System Replacement					$ 150,000					
	403	Electrical Allowance @ 10% (min $1,000.00)	$ 1,000			$ 1,000	$ 15,000				$ 1,000	
		Electrical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ 1,000**	**$ 165,000**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**
Miscellaneous												
	501	Paint Curbs, Wheelstops and Islands Safety Yellow	$ 3,768									
	502	Repaint Traffic Markings				$ 17,125						
	503	Clean and Paint Metal Pan Stairs										
	504	Repair Loose Stair Nosings				$ 1,688						
	505	Replace Door, Frame and Hardware				$ 4,375						
	506	Clean and Paint Door and Door Frame										
	507	Repaint Stair Railings										
	508	Railing Infill for Excessive Gap										
	509	Install Fencing under Lowest Stair Run										
	510	Replace Stair Tower Roof										
	511	Repair Broken Fencing	$ 125									
	512	Conduct an ASR Study				$ 25,000						
		Miscellaneous Sub-Total	**$ 3,893**	**$ -**	**$ -**	**$ 48,188**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
		Construction Subtotal	$ 28,722	$ -	$ -	$ 518,269	$ 165,000	$ -	$ -	$ -	$ 139,236	$ -
		Mobilization @ 6% of Construction Subtotal	$ 1,723	$ -	$ -	$ 31,096	$ 9,900	$ -	$ -	$ -	$ 8,354	$ -
		Construction Total	**$ 30,446**	**$ -**	**$ -**	**$ 549,365**	**$ 174,900**	**$ -**	**$ -**	**$ -**	**$ 147,590**	**$ -**
		Project Contingency @ 15%	$ 4,567	$ -	$ -	$ 82,405	$ 26,235	$ -	$ -	$ -	$ 22,139	$ -
		Engineering: Contract Documents/Field Rep @ 15%	$ 4,567	$ -	$ -	$ 82,405	$ 26,235	$ -	$ -	$ -	$ 22,139	$ -
		Material Testing During Construction	$ 304	$ -	$ -	$ 5,494	$ 1,749	$ -	$ -	$ -	$ 1,476	$ -
		Project Cost Totals Per Year:	**$ 39,884**	**$ -**	**$ -**	**$ 719,668**	**$ 229,119**	**$ -**	**$ -**	**$ -**	**$ 193,343**	**$ -**

NOTES:

1. Estimated costs are based on multi-year construction seasons.
2. Estimated costs are based on historical records of similar types of work.
   Costs may vary due to time of year, local economy, or other factors.
3. Costs assume no hazardous waste and a landfill located within 50 miles.
4. Cost based on normal work week, daylight hours and non-union labor.

APPENDIX B

WALKER
RESTORATION CONSULTANTS

Photo 1

Vehicular bridge over tracks between garages.

Photo 2

Vehicular bridge over tracks between garages.

Photo 3

Leaching cracks on underside of vehicular bridge over station.

Uneven metal plates embedded into stair landing.

Photo 4

Damaged lower level expansion joint.

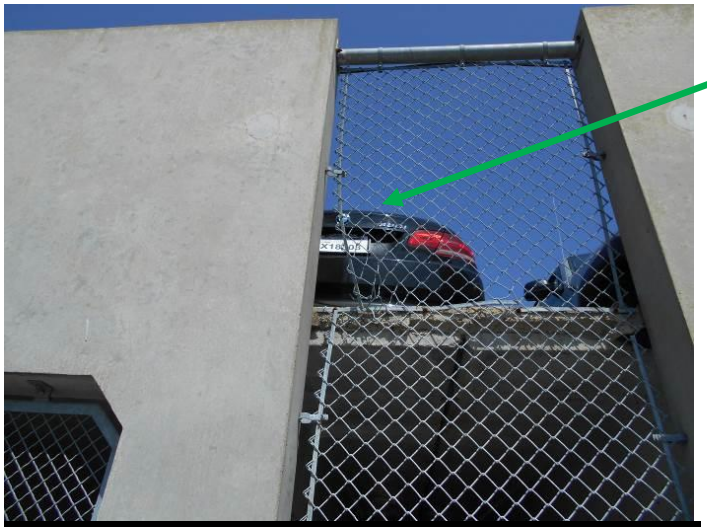
Photo 5

Roof level expansion joint in fair condition.

Photo 6

Shear transfer devices in good condition.

Photo 7



Damaged fencing.

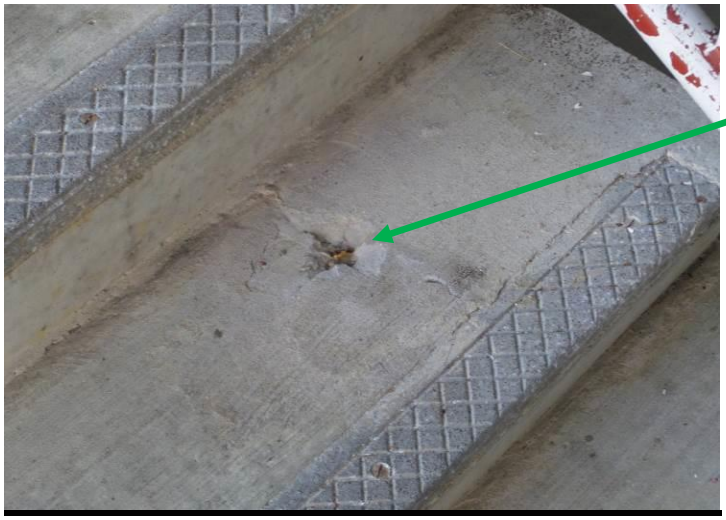
Photo 8

Soffit spall in tee at shear wall.

Photo 9

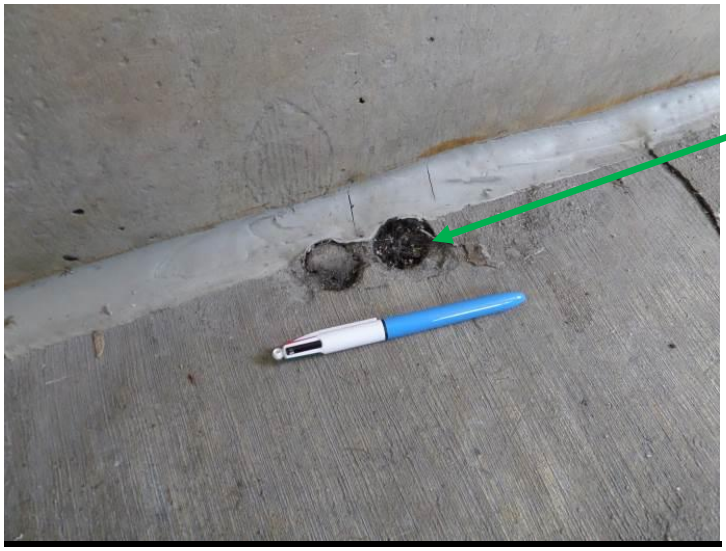
Spall on stair landing.

Photo 10



Spall on stair tread.

Photo 11

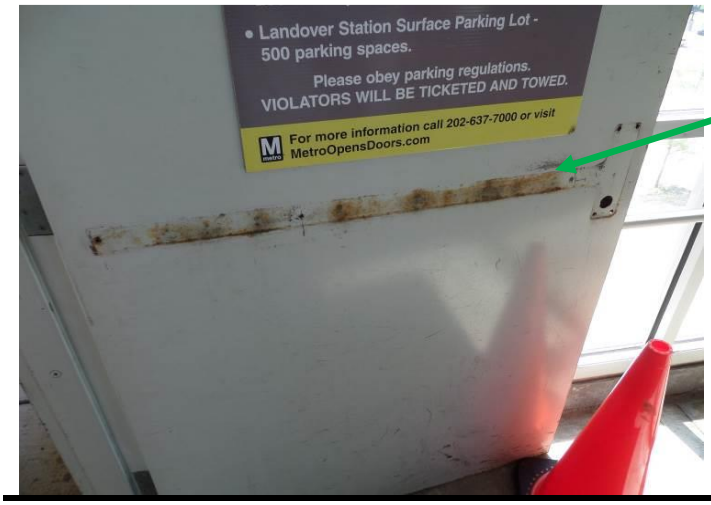


Conduit holes in stair landing.

Photo 12

Ponding on stair landings

Photo 13



Missing panic hardware.

Photo 14

Damaged door frame.

Photo 15

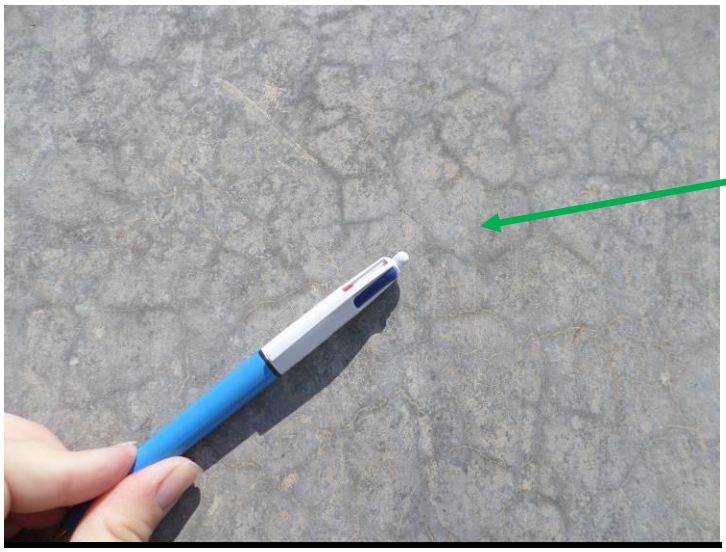


Photo 16

Cracking pattern indication of ASR on lightwall.

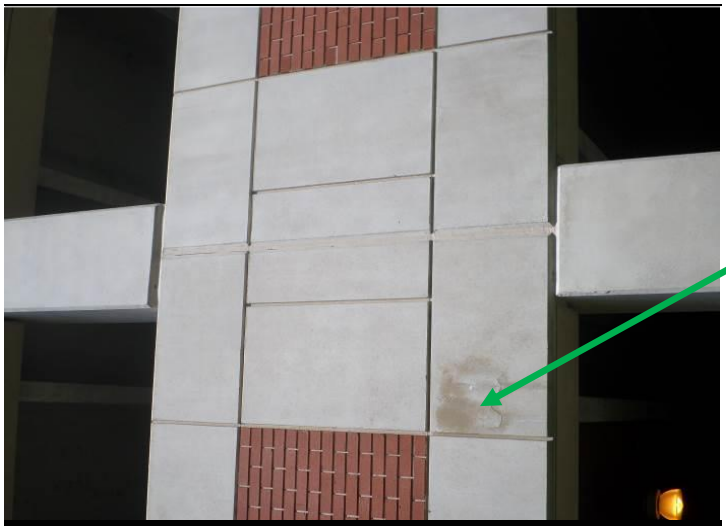


Photo 17

Leaching at shear wall spall.

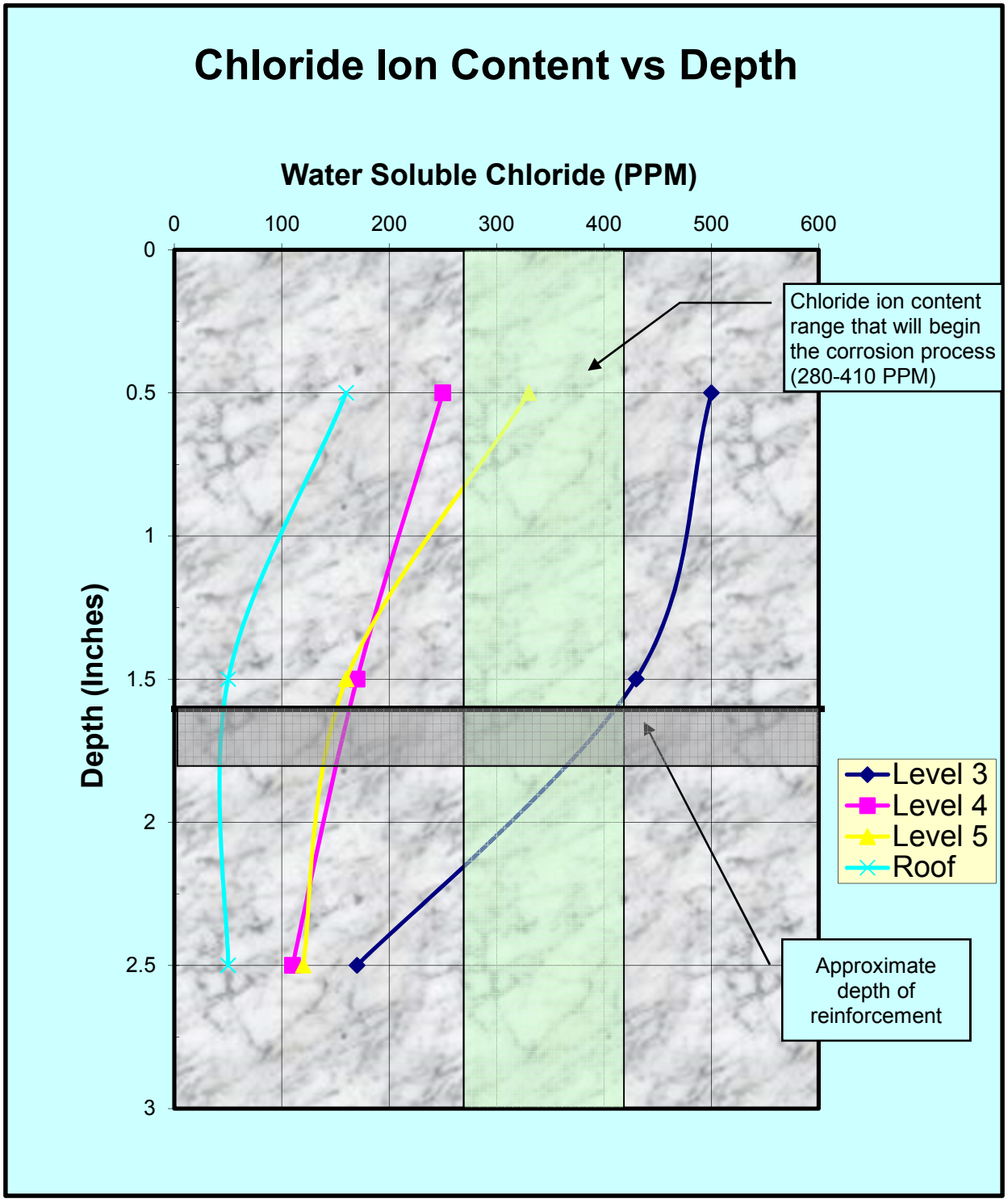
Photo 18

Spall in column.

APPENDIX C

WALKER
RESTORATION CONSULTANTS

Project # 14-3944.04
Date Jun-14



UNIVERSAL CONSTRUCTION TESTING, Ltd.

Project: Washington Metropolitan Area Transit Authority
Maryland, Virginia & Washington DC

UCT Project No. 14084
Walker Project No. 14-3994.00

Client: Walker Restoration Consultants

Date: May 12, 2014

Table 1.4. **Chloride Content of Concrete**
(Water-Soluble)
AASHTO T 260

Sample Number	Location in Structure	Level tested, inch from top	Chloride ion (CL^-) Content		
			by weight of concrete %	by weight of cement* %	by weight of concrete (ppm)*
Largo South Garage					
3	Level 3	0-1	0.050	**0.32**	500
	Intermediate	1-2	0.043	**0.28**	430
		2-3	0.017	**0.11**	170
4	Level 4	0-1	0.025	**0.16**	250
	Intermediate	1-2	0.017	**0.11**	170
		2-3	0.011	**0.07**	110
5	Level 5	0-1	0.033	**0.21**	330
	Intermediate	1-2	0.016	**0.10**	160
		2-3	0.012	**0.08**	120
6	Level 6	0-1	0.016	**0.10**	160
	Roof	1-2	0.005	**0.04**	50
		2-3	0.005	**0.04**	50

Remarks: *) Assumed cement content 600 lbs/cu.yd. and U.W. = 3800 pcy.

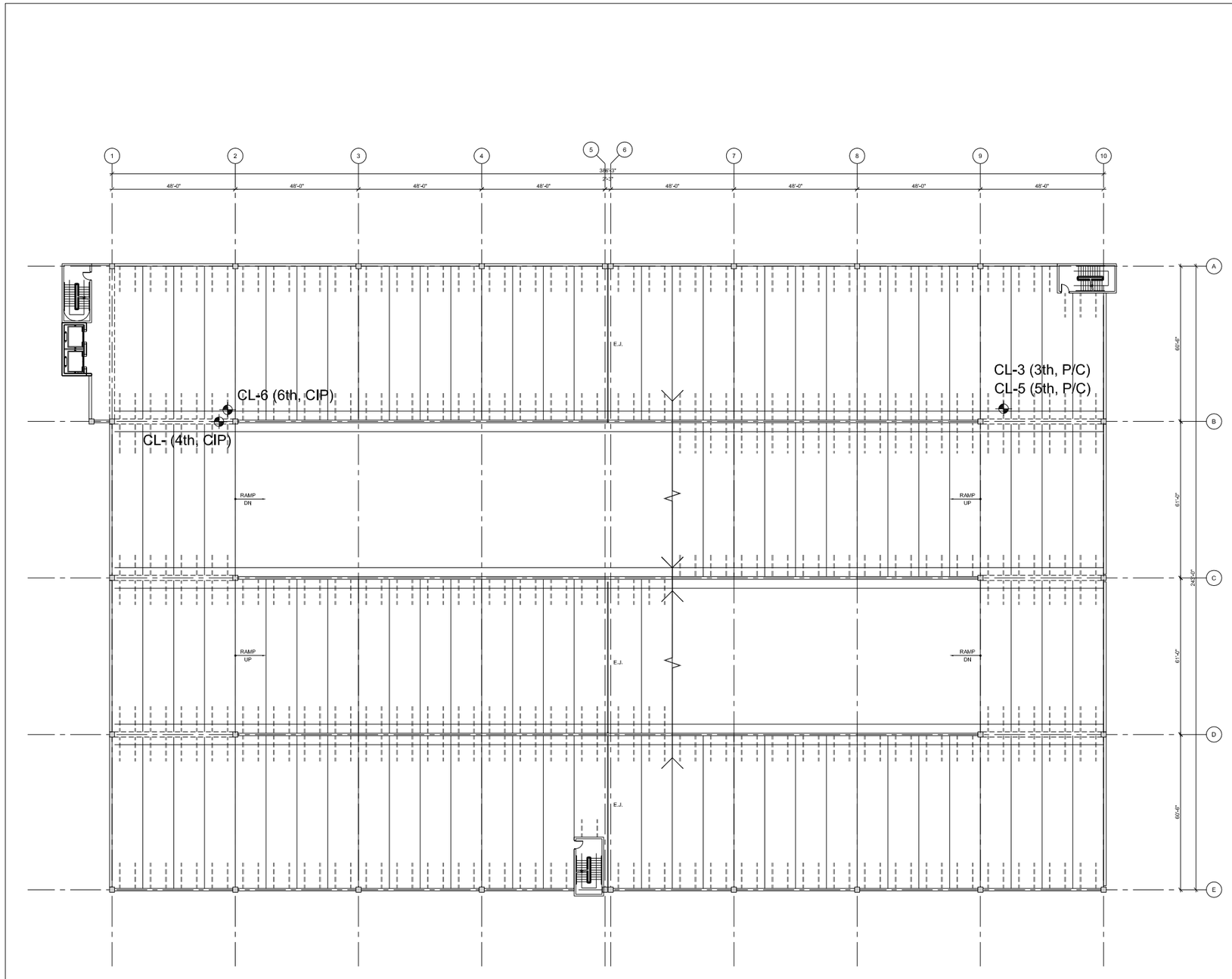
UNIVERSAL CONSTRUCTION TESTING

APPENDIX D

WALKER
RESTORATION CONSULTANTS

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY - LARGO SOUTH GARAGE
UPPER MARLBORO, MARYLAND

WALKER PARKING CONSULTANTS



CHLORIDES
SAMPLE LOCATIONS

LEGEND:

CL-1 CONCRETE SAMPLE
THE FIRST NUMBER REFERS TO THE SAMPLE NUMBER. THE SECOND NUMBER REFERS TO THE FLOOR WHERE THE SAMPLE WAS TAKEN. THE FINAL SYMBOL (P/C = PRECAST, CIP = CAST IN PLACE) REFERS TO THE TYPE OF CONCRETE FROM WHICH THE SAMPLE WAS TAKEN. TAKEN 4/14/2014

LEGEND

NORTH

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

R-701

04/03/2014 14-944.00

APPENDIX E

WALKER
RESTORATION CONSULTANTS

Kletsko, Marissa

From: Neiderer, Greg
Sent: Thursday, May 22, 2014 1:01 PM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Gross, Jason @ Walker; Stairs, Kathryn
Subject: 2014 05 22 WMATA Largo North & South Near Term Actions
Attachments: SAM_1576.jpg; SAM_1553.jpg; SAM_1555.jpg; SAM_1572.jpg; DSCN0530.jpg; DSCN0522.jpg; DSCN0528.jpg; DSCN0536.jpg; DSCN0534.jpg; DSCN0537.jpg

Patrick,

We reviewed these garages on 5/19 and we found the following items in need of action:

South:

1. There is a 1 s.f. spall on the exterior of the spandrel on the second tier, C.L. E-7.
2. The expansion joint nosing is damaged and could pose a trip hazard on level 2 between C.L. C and D. See photo 1553.
3. There is spalled overhead concrete near the shearwall at C.L. D-4, soffit of Level 3. See photo 1555.
4. There are small (<1 s.f.) spalls on the exterior of roof level spandrels at C.L. E-10 and A-5. See photo 1572 for E-10.
5. There is loose overhead concrete near C.L. E-9, roof level soffit.
6. There are multiple loose overhead small spalls throughout the soffit of all levels.
7. There is damaged fencing along grid B between grids 7-8 on the top tier. Photo 522
8. There is loose wood forms adjacent to a column in front of the main stair/elevator tower on soffit of levels 2 and 3. Photo 528
9. There is a curb that varies in height in front of the main stair/elevator tower that is not painted.
10. There is an exposed cable in the slab of level 2 along the Inverted T beam grid B between 9-10. Photo 530

North:

11. Numerous small (<1 s.f.) spalls on stair treads, multiple levels, main stair. See photo 1576.
12. Failing/torn expansion joint at bridge connection top tier. Photo 532
13. There is a curb that varies in height in front of the main stair/elevator tower that is not painted. Photo 534
14. There is overhead soffit spalls on underside of inverted tee beam grid B between grids 1-2 top tier. Photo 536
15. There are multiple loose overhead small spalls throughout the soffit of all levels. Photo 537

Please address the soffit and wall spalls by removal, fill the floor spalls and exposed cables to remove tripping hazards, paint the curbs and address damaged fencing and masonry.

Gregory J. Neiderer, PE
Principal

Walker Restoration Consultants | Walker Parking Consultants
565 East Swedesford Road, Suite 300 | Wayne, PA 19087
610.995.0260 x 1408 (Office) | 610.659.6967 (Cell) | 610.995.0261 (Fax)

www.walkerrestoration.com | www.walkerparking.com

To send me a file larger than 10MB, please use this File Transfer

Thanks,

Kathryn E. Stairs, P.E.
Project Manager

Walker Restoration Consultants | Walker Parking Consultants
565 East Swedesford Road, Suite 300 | Wayne, PA 19087
610.995.0260 x 1405 (Office) | 610.662.8854 (Cell) | 610.995.0261 (Fax)
www.walkerrestoration.com | www.walkerparking.com









MINNESOTA AVENUE

WALKER
RESTORATION CONSULTANTS

FEBRUARY 2015 14-3944.04

The summary data for the facility is as follows:

Table MINNE-1: Facility Information Summary

	MINNESOTA AVENUE
Location:	4052 Minnesota Avenue, NE Washington, DC 20019
Overall Condition:	**GOOD**
Current Needs:	**MINOR**
Chloride Contamination	**MODERATE**
Year built:	2009
Supported Levels	3
Levels Below Grade	1
Parking Space Capacity:	516
Parking Efficiency:	327 SF/Space
Footprint:	Approximately 320' x 120'
Bridges:	None
Vehicle Circulation:	Single Helix
Pedestrian Circulation	3 Stair(s), 2 Elevator(s)
Parking Area: Slab on Grade Total Supported Area Total Parking Area	 37,000 ± SF 132,000 ± SF 169,000 ± SF
Structural System	Precast Field-topped Double Tee
Façade Spandrel Treatment	Precast

FACILITY DESCRIPTION

NORTH VIEW

SOUTH VIEW

EAST VIEW

WEST VIEW

PLAN VIEW

FEBRUARY 2015 14-3944.04

EXECUTIVE SUMMARY

This 2009 garage is in good shape, has moderate chloride contamination and has minor current repair needs

Its scheduled repairs are anticipated to cost:

2019 – Near Term - $241,402
2022 – Long-term - $83,680

See Appendix A for cost details.

CRITICAL REPAIRS

The following safety related items requiring urgent action were identified in our 5/22/14 email to Metro:

1. Stair tread spalls
2. Ponding water

Please see the above reference email, found in Appendix E, for more detail and recommended actions. We have no further immediate concerns.

NEAR-TERM REPAIRS

Due to the age and condition of the garage we recommend most of the non-critical repairs be completed in 2019, year four of the master repair plan. These near-term repairs include addressing the structural items found including:

1. Remove and replace spalled overhead concrete found on columns, with repair concrete anchored with supplementary embedded steel pins. Monitor this condition at least every 6 months until replacement and remove loose concrete.
2. Remove and replace stair tread and landing spalled concrete with repair concrete.
3. Remove and replace deteriorated wash concrete
4. Install new supplemental floor drains
5. Install new supplemental floor piping
6. Repaint rusting at grade railing
7. Repaint curbs

RECOMMENDATIONS

Based on chloride test results, we recommend the following improvements to protect the floor structural system:

1. Install penetrating sealer at the lowest supported level

LONG-TERM REPAIRS

Long term repairs include a second round of structural and waterproofing repairs in 2022, three years after the near-term repairs to address continued deterioration of the concrete and the end of the useful life of the waterproofing products. Long-term repairs items include the following:

1. Replace roof level floor sealants

OBSERVATIONS AND DISCUSSION

CONDITION ASSESSMENT

The following observations were made during a facility walk through on the May 19 to 21, 2014 site visit. Photographs referenced within the observations are found in Appendix B of the report. Observations are immediately followed by a brief discussion of the repair in italics.

1. Roof level floor sealants are in good condition and require replacement within 10 years.
2. Interior floor sealants are in good condition and require replacement beyond 10 years.
3. Roof level expansion joints are in good condition and require replacement within 10 years.
4. Interior level expansion joints are in good condition and require replacement beyond 10 years.
5. A minor portion of the roof level concrete wash is damaged which requires repair (Photo 5).
6. Changes in floor elevation, curbs, are not readily visually apparent and require painting now with safety yellow paint to emphasize elevations changes (Photo 1,2)
7. Stair treads and landings were observed to have spalls which require repair now to eliminate trip hazards. (Photo 7,8)
8. A few columns were observed to be cracked/spalled which requires structural repair. (Photo 9)
9. The fencing is rusting and requires repainting. (Photo 10,11).

10. A minor amount of localized ponding was observed and new supplemental drains need to be installed. (Photo 3,4)

MATERIAL TESTING

Concrete powder samples were extracted from floor surfaces of the roof and intermediate supported levels of the parking garage as shown in Appendix C. The chloride content was determined at 3 depths: near the surface (0-1 inch depth), near the design location for top reinforcing steel/tee connections (1 to 2 inch depth), and near the center of the slab (2 to 3 inch depth). Locations were taken in both cast-in-place concrete as well as precast concrete, if present, to determine the extent of chloride contamination in these differing concretes. The results are included in Appendix D. These chloride contents provide an indication of the current and expected future deterioration of the parking structure due to chloride-induced corrosion of the reinforcing steel. A typical threshold chloride value for the onset of corrosion is between 280 and 410 parts per million. The determined values are defined as minor (less than 200 ppm at the 1 to 2 inch depth), moderate (between 200 ppm and 400 ppm at the 1 to 2 inch depth, and large (greater than 400 ppm at the 1 to 2 inch depth. The extent of chloride contamination directly influences our recommended floor surface treatment (nothing, penetrating sealer, traffic topping).

The summary of chlorides test results in Appendix C are;

Level	Depth	Type	PPM
2	1 to 2	P/C	400
3	1 to 2	CIP	110
4 (Roof)	1 to 2	CIP	180

APPENDIX A

WALKER
RESTORATION CONSULTANTS

MINNESOTA GARAGE

Opinion of Probable Cost for Master Repair Plan
Recommended Phasing : 10 Year Program

	Work Item	Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Structural												
	101	Precast Slab Repair				$ 68,533						
	102	Precast Tee Stem Repair				$ 4,694						
	103	Precast Beam Repair				$ 2,962						
	104	Precast Shear Connector Repair				$ 6,164						
	105	Precast Column/Wall Repair				$ 2,432						
	109	Stair Tread Concrete Repair	$ 600									
	110	Epoxy Crack Injection										
	111	Masonry Repair										
	112	Replace Double Tee Bearing Pad										
	113	Repair Loose Bollard										
	115	Structural Repair Allowance @15% (min $1,000.00)	$ 1,000			$ 12,718			$ 1,000			
		Structural Sub-Total	**$ 1,600**	**$ -**	**$ -**	**$ 97,503**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Waterproofing												
	202	Façade Sealant Replacement - Precast										
	205	Cove Sealant Replacement - Precast Roof							$ 11,173			
	206	Cove Sealant Replacement - Precast Covered Levels										
	209	Floor Sealant Replacement - Precast Roof							$ 40,883			
	210	Floor Sealant Replacement - Precast Covered Levels										
	211	Rout and Seal Cracks				$ 12,188						
	212	Traffic Topping Repair										
	213	Traffic Topping - New Installation										
	214	Concrete Sealer				$ 38,000						
	215	Masonry Sealer										
	216	Expansion Joint Replacement - Roof										
	217	Expansion Joint Replacement - Covered Levels										
	218	Caulk Handrail Bases										
	221	Waterproofing Repair Allowance @ 10% (min $1,000.00)	$ 1,000			$ 5,019			$ 5,206			
		Waterproofing Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ 55,206**	**$ -**	**$ -**	**$ 57,262**	**$ -**	**$ -**	**$ -**
Mechanical												
	301	Repair Leaking Drainage Piping										
	302	New Drain & Piping	$ 4,813									
	303	Repair Existing Trench Drains										
	305	Mechanical Allowance @ 10% (min $1,000.00)	$ 1,000			$ 1,000			$ 1,000			
		Mechanical Sub-Total	**$ 5,813**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Electrical												
	401	PARC System Replacement					$ 150,000					
	403	Electrical Allowance @ 10% (min $1,000.00)	$ 1,000			$ 1,000	$ 15,000		$ 1,000			
		Electrical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ 1,000**	**$ 165,000**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Miscellaneous												
	501	Paint Curbs, Wheelstops and Islands Safety Yellow				$ 2,324						
	502	Repaint Traffic Markings				$ 10,563						
	503	Clean and Paint Metal Pan Stairs										
	504	Repair Loose Stair Nosings										
	505	Replace Door, Frame and Hardware										
	506	Clean and Paint Door and Door Frame										
	507	Repaint Stair Railings				$ 6,250						
	508	Railing Infill for Excessive Gap										
	509	Install Fencing under Lowest Stair Run										
	510	Replace Stair Tower Roof										
	511	Repair Broken Handrail										
		Miscellaneous Sub-Total	**$ -**	**$ -**	**$ -**	**$ 19,136**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
		Construction Subtotal	$ 9,413	$ -	$ -	$ 173,846	$ 165,000	$ -	$ 60,262	$ -	$ -	$ -
		Mobilization @ 6% of Construction Subtotal	$ 565	$ -	$ -	$ 10,431	$ 9,900	$ -	$ 3,616	$ -	$ -	$ -
		Construction Total	**$ 9,977**	**$ -**	**$ -**	**$ 184,276**	**$ 174,900**	**$ -**	**$ 63,878**	**$ -**	**$ -**	**$ -**
		Project Contingency @ 15%	$ 1,497	$ -	$ -	$ 27,641	$ 26,235	$ -	$ 9,582	$ -	$ -	$ -
		Engineering: Contract Documents/Field Rep @ 15%	$ 1,497	$ -	$ -	$ 27,641	$ 26,235	$ -	$ 9,582	$ -	$ -	$ -
		Material Testing During Construction	$ 100	$ -	$ -	$ 1,843	$ 1,749	$ -	$ 639	$ -	$ -	$ -
		Project Cost Totals Per Year:	**$ 13,070**	**$ -**	**$ -**	**$ 241,402**	**$ 229,119**	**$ -**	**$ 83,680**	**$ -**	**$ -**	**$ -**

NOTES:

1. Estimated costs are based on multi-year construction seasons.
2. Estimated costs are based on historical records of similar types of work.
   Costs may vary due to time of year, local economy, or other factors.
3. Costs assume no hazardous waste and a landfill located within 50 miles.
4. Cost based on normal work week, daylight hours and non-union labor.

APPENDIX B

WALKER
RESTORATION CONSULTANTS

Unpainted curb. Curbs are recommended to be painted yellow.

Photo 1

Unpainted curb. Curbs are recommended to be painted yellow.

Photo 2

Ponding at shearwall.

Photo 3

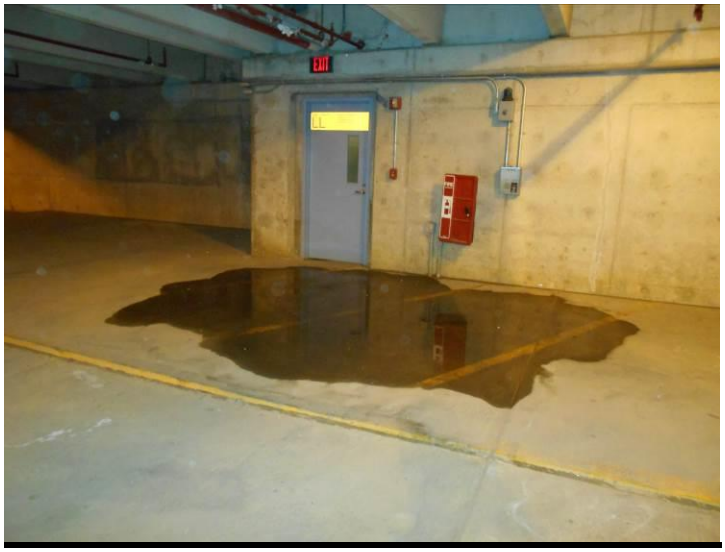


Photo 4

Ponding at stairtower doorway.

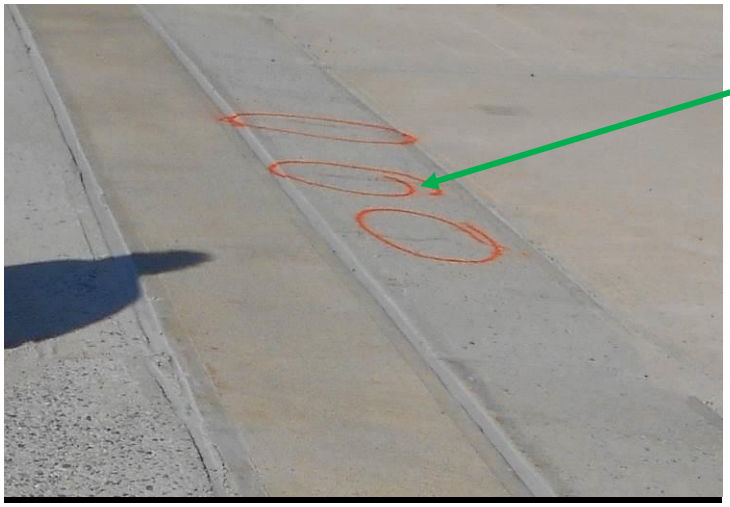


Photo 5

Delaminated topping.

Photo 6

Stairs.

Photo 7

Spall on stair tread.

Photo 8

Damaged stair.

Photo 9

Crack in column with failing previous repair.

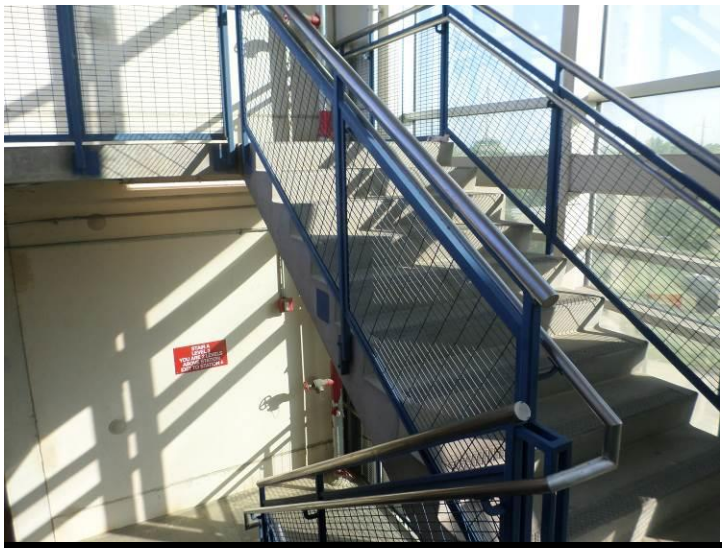
Railing at ground level.

Photo 10

Close-up of rusting railing; spall at connection.

Concrete curb is deteriorating

Photo 11



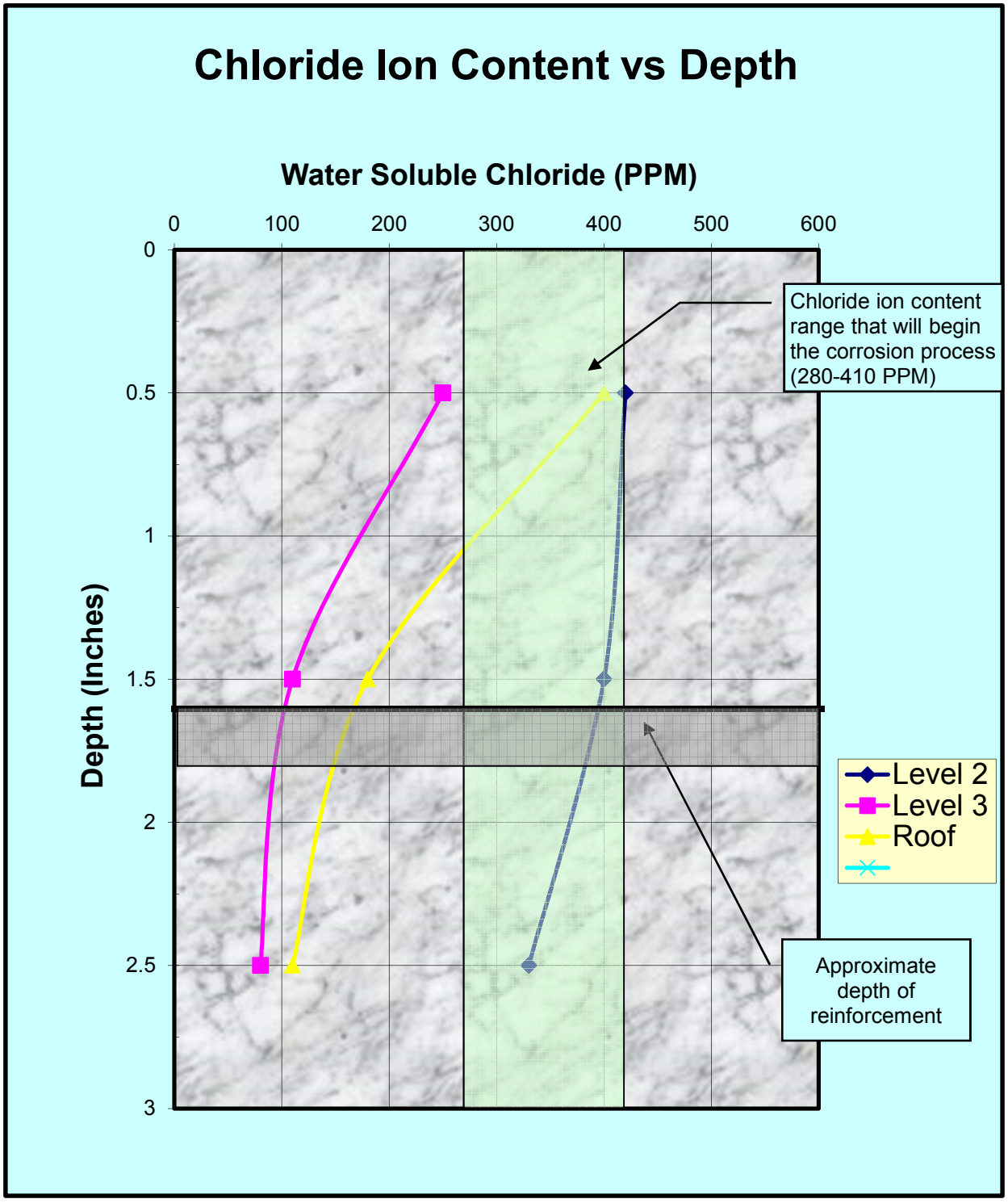
Black stair nosings provide color contrast so no yellow paint is recommended.

Photo 12

APPENDIX C

WALKER
RESTORATION CONSULTANTS

Project # 14-3944.04
Date Jun-14



UNIVERSAL CONSTRUCTION TESTING, Ltd.

Project: Washington Metropolitan Area Transit Authority
Maryland, Virginia & Washington DC

UCT Project No. 14084
Walker Project No. 14-3994.00

Client: Walker Restoration Consultants

Date: May 12, 2014

Table 1.5. **Chloride Content of Concrete**
(Water-Soluble)
AASHTO T 260

Sample Number	Location in Structure	Level tested, inch from top	Chloride ion (CL^-) Content		
			by weight of concrete %	by weight of cement* %	by weight of concrete (ppm)*
Minnesota Avenue Garage					
2	Level 2	0-1	0.042	**0.26**	420
		1-2	0.040	**0.25**	400
		2-3	0.033	**0.21**	330
3	Level 3	0-1	0.025	**0.16**	250
		1-2	0.011	**0.07**	110
		2-3	0.008	**0.05**	80
4	Level 4	0-1	0.040	**0.25**	400
	Roof Level	1-2	0.018	**0.11**	180
		2-3	0.011	**0.07**	110

Remarks: *) Assumed cement content 600 lbs/cu.yd. and U.W. = 3800 pcy.

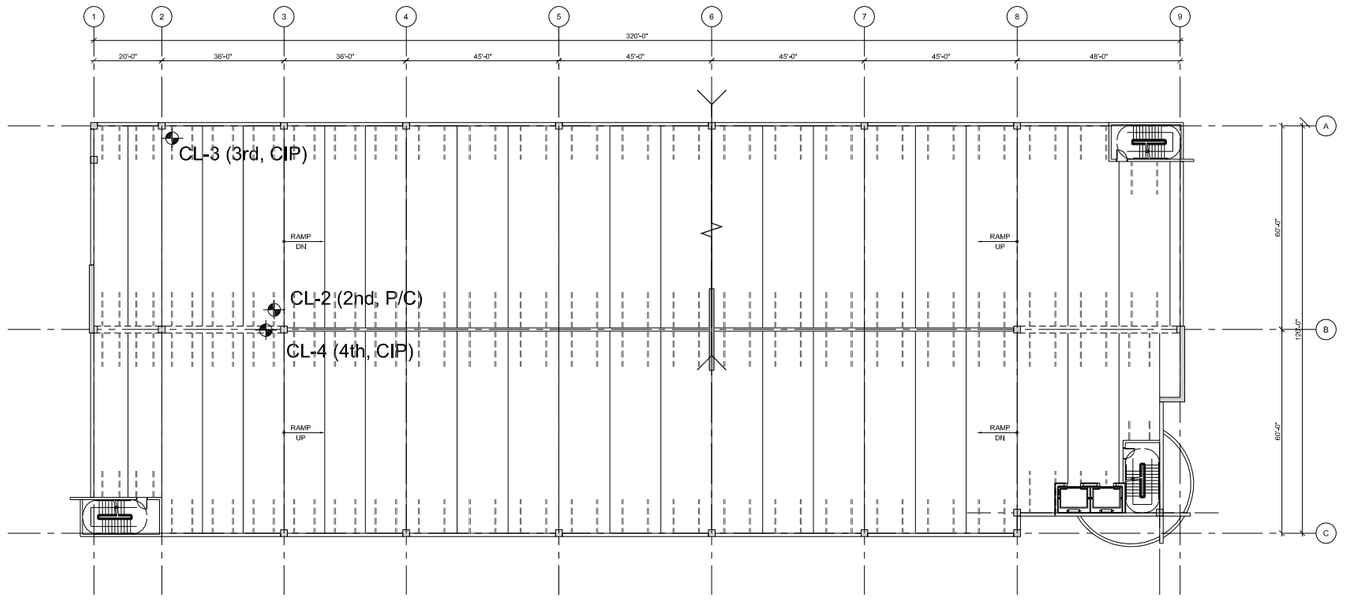
APPENDIX D

WALKER
RESTORATION CONSULTANTS

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY - MINNESOTA AVENUE GARAGE
WASHINGTON, DC

WALKER PARKING CONSULTANTS

CHLORIDES
SAMPLE LOCATIONS



LEGEND:

CL-1 CONCRETE SAMPLE
THE FIRST NUMBER REFERS TO THE SAMPLE NUMBER. THE SECOND NUMBER REFERS TO THE FLOOR WHERE THE SAMPLE WAS TAKEN. THE FINAL SYMBOL (P/C = PRECAST, CIP = CAST IN PLACE) REFERS TO THE TYPE OF CONCRETE FROM WHICH THE SAMPLE WAS TAKEN. TAKEN 4/14/2014

LEGEND

NORTH

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

R-701

04/03/2014 14-944.00

APPENDIX E

WALKER
RESTORATION CONSULTANTS

Kletsko, Marissa

From: Neiderer, Greg
Sent: Thursday, May 22, 2014 1:39 PM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Gross, Jason @ Walker; Stairs, Kathryn
Subject: 2014 05 22 WMATA Minnesota Near Term Actions
Attachments: DSCN0496.jpg; DSCN0497.jpg

Patrick,

Below are the items we observed on 5/20 that require near term actions at Minnesota Ave.

1. There is ponding at the Shearwall at C.L. B-6.
2. Numerous small (<1 s.f.) spalls on stair treads, multiple levels, main stair and secondary stairs.
3. There is ponding in front of the stair tower in the basement level.

Photos 496 and 497 show the ponding at shearwall and stair tower, these items should be repaired this summer to eliminate icy patches next winter..

Thanks

Gregory J. Neiderer, PE
Principal

Walker Restoration Consultants | **Walker Parking Consultants**
565 East Swedesford Road, Suite 300 | Wayne, PA 19087
610.995.0260 x 1408 (Office) | 610.659.6967 (Cell) | 610.995.0261 (Fax)
www.walkerrestoration.com | www.walkerparking.com

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EXIT

NEW CARROLLTON

WALKER
RESTORATION CONSULTANTS

FEBRUARY 2015 14-3944.04

The summary data for the facility is as follows:

Table NEWCR-1: Facility Information Summary

	NEW CARROLLTON
Location:	Corporate and Garden City Drives New Carrollton, MD 20784
Overall Condition:	**GOOD**
Current Needs:	**MINOR**
Chloride Contamination	**MODERATE**
Year built:	2005
Supported Levels	7
Levels Below Grade	0
Parking Space Capacity:	1,817
Parking Efficiency:	303 SF/Space
Footprint:	Approximately 390' x 185'
Bridges:	None
Vehicle Circulation:	Double Helix
Pedestrian Circulation	3 Stair(s), 3 Elevator(s)
Parking Area: Slab on Grade Total Supported Area Total Parking Area	 72,000 ± SF 480,000 ± SF 552,000 ± SF
Structural System	Precast Un-topped Double Tee
Façade Spandrel Treatment	Precast

FACILITY DESCRIPTION

NORTH VIEW

SOUTH VIEW

EAST VIEW

WEST VIEW

PLAN VIEW

FEBRUARY 2015 14-3944.04

EXECUTIVE SUMMARY

This 2005 garage is in good shape, has moderate chloride contamination and has minor current repair needs

Its scheduled repairs are anticipated to cost:

2019 – Near Term - $1,210,823
2022 – Long-term - $741,047

See Appendix A for cost details.

CRITICAL REPAIRS

The following safety related items requiring urgent action were identified in our 5/22/14 email to Metro:

1. Overhead spalls at tee to tee connections
2. Loose expansion joint glands (trip hazard)
3. Broken fencing
4. Failing door hardware

Please see the above reference email, found in Appendix E, for more detail and recommended actions. We have no further immediate concerns.

NEAR-TERM REPAIRS

Due to the age and condition of the garage we recommend most of the non-critical repairs be completed in 2019, year four of the master repair plan. These near-term repairs include addressing the structural items found including:

1. Remove and replace spalled overhead concrete found on beam to column connections with repair concrete anchored with supplementary embedded steel pins. Monitor this condition at least every 6 months until replacement and remove loose concrete.
2. Replace roof level floor sealants
3. Replace roof level expansion joint glands
4. Replace stair tower door hardware

RECOMMENDATIONS

5. Repaint traffic ballards at roof
6. Repair elevator door threshold
7. Repair fencing

Based on chloride test results, we recommend the following improvements to protect the floor structural system:

1. Install traffic topping at all cast-in-place washes on the interior

LONG-TERM REPAIRS

Long term repairs include a second round of structural and waterproofing repairs in 2022, three years after the near-term repairs to address continued deterioration of the concrete and the end of the useful life of the waterproofing products. Long-term repairs items include the following:

1. Replace interior level floor sealants
2. Replace interior level expansion joint glands

CONDITION ASSESSMENT

OBSERVATIONS AND DISCUSSION

The following observations were made during a facility walk through on the May 19 to 20, 2014 site visit. Photographs referenced within the observations are found in Appendix B of the report. Observations are immediately followed by a brief discussion of the repair in italics.

1. Roof level floor sealants are in fair condition and require replacement within 5 years. (Photo 3,4,5)
2. Interior floor sealants are in good condition and require replacement within 10 years.
3. Roof level expansion joints are in fair condition and require replacement within 5 years. (Photo 1,2)
4. Interior level expansion joints are in good condition and require replacement within 10 years.
5. A minor portion of the roof level floor is damaged by scaling and insufficient cover which requires repair (Photo 6,7).
6. A minor number of bollard base plate connections were observed to be rusting which requires repair (Photo 16).
7. A few double tee flanges above tee stems were

observed to have cracking which requires structural repair and waterproofing (Photo 8).

8. A column splice connection was observed observed to be leaching and spalled which requires structural repair. (Photo 15)
9. A spandrel to wall welded connection was observed to have been modified after construction. Upon investigation, it was confirmed that the modification was required. The original welded connection was found to be an inappropriate connection and was therefore cut and a slip joint was installed by the originall precaster, High Concrete. (Photo 14,18)
10. The roof and interior level stairtower door thresholds and hardware are moderately damaged or missing which requires replacement (Photo 9,10,11,12,13).
11. An interior fencing barrier is damaged and requires repair now. (Photo 17)

MATERIAL TESTING

Concrete powder samples were extracted from floor surfaces of the roof and intermediate supported levels of the parking garage as shown in Appendix C. The chloride content was determined at 3 depths: near the surface (0-1 inch depth), near the design location for top reinforcing steel/tee connections (1 to 2 inch depth), and near the center of the slab (2 to 3 inch depth). Locations were taken in both cast-in-place concrete as well as precast concrete, if present, to determine the extent of chloride contamination in these differing concretes. The results are included in Appendix D. These chloride contents provide an indication of the current and expected future deterioration of the parking structure due to chloride-induced corrosion of the reinforcing steel. A typical threshold chloride value for the onset of corrosion is between 280 and 410 parts per million. The determined values are defined as minor (less than 200 ppm at the 1 to 2 inch depth), moderate (between 200 ppm and 400 ppm at the 1 to 2 inch depth, and large (greater than 400 ppm at the 1 to 2 inch depth. The extent of chloride contamination directly influences our recommended floor surface treatment (nothing, penetrating sealer, traffic topping).

The summary of chlorides test results in Appendix C are;

Level	Depth	Type	PPM
2	1 to 2	CIP	180
3	1 to 2	CIP	1,240
4	1 to 2	P/C	340
5	1 to 2	CIP	290
6	1 to 2	CIP	1,370
7	1 to 2	P/C	340
8 (Roof)	1 to 2	CIP	130

APPENDIX A

WALKER
RESTORATION CONSULTANTS

NEW CARROLTON GARAGE

Opinion of Probable Cost for Master Repair Plan
Recommended Phasing : 10 Year Program

	Work Item	Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Structural												
	101	Precast Slab Repair	$ 3,510			$ 31,590						
	102	Precast Tee Stem Repair				$ 2,404						
	103	Precast Beam Repair				$ 1,517						
	104	Precast Shear Connector Repair				$ 3,157						
	105	Precast Column/Wall Repair				$ 1,245						
	109	Stair Tread Concrete Repair										
	110	Epoxy Crack Injection										
	111	Masonry Repair										
	112	Replace Double Tee Bearing Pad										
	113	Repair Loose Bollard										
	115	Structural Repair Allowance @15% (min $1,000.00)	$ 1,000			$ 5,987			$ 1,000			
		Structural Sub-Total	**$ 4,510**	**$ -**	**$ -**	**$ 45,901**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Waterproofing												
	202	Façade Sealant Replacement - Precast										
	205	Cove Sealant Replacement - Precast Roof				$ 21,412						
	206	Cove Sealant Replacement - Precast Covered Levels							$ 95,865			
	209	Floor Sealant Replacement - Precast Roof				$ 78,346						
	210	Floor Sealant Replacement - Precast Covered Levels							$ 386,557			
	211	Rout and Seal Cracks				$ 12,188						
	212	Traffic Topping Repair										
	213	Traffic Topping - New Installation				$ 415,800						
	214	Concrete Sealer										
	215	Masonry Sealer										
	216	Expansion Joint Replacement - Roof	$ 8,776			$ 17,818						
	217	Expansion Joint Replacement - Covered Levels				$ 159,563						
	218	Caulk Handrail Bases										
	221	Waterproofing Repair Allowance @ 10% (min $1,000.00)	$ 1,000			$ 70,513			$ 48,242			
		Waterproofing Sub-Total	**$ 9,776**	**$ -**	**$ -**	**$ 775,639**	**$ -**	**$ -**	**$ 530,665**	**$ -**	**$ -**	**$ -**
Mechanical												
	301	Repair Leaking Drainage Piping										
	302	New Drain & Piping				$ 2,406						
	303	Repair Existing Trench Drains										
	305	Mechanical Allowance @ 10% (min $1,000.00)	$ 1,000			$ 1,000			$ 1,000			
		Mechanical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ 3,406**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Electrical												
	401	PARC System Replacement					$ 150,000					
	403	Electrical Allowance @ 10% (min $1,000.00)	$ 1,000			$ 1,000	$ 15,000		$ 1,000			
		Electrical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ 1,000**	**$ 165,000**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ -**
Miscellaneous												
	501	Paint Curbs, Wheelstops and Islands Safety Yellow				$ 7,590						
	502	Repaint Traffic Markings				$ 34,500						
	503	Clean and Paint Metal Pan Stairs										
	504	Repair Loose Stair Nosings										
	505	Replace Door Hardware	$ 13,125									
	506	Clean and Paint Door and Door Frame				$ 3,938						
	507	Repaint Stair Railings										
	508	Railing Infill for Excessive Gap										
	509	Install Fencing under Lowest Stair Run										
	510	Replace Stair Tower Roof										
	511	Repair Fencing	$ 125									
		Miscellaneous Sub-Total	**$ 13,250**	**$ -**	**$ -**	**$ 46,028**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
		Construction Subtotal	$ 29,536	$ -	$ -	$ 871,974	$ 165,000	$ -	$ 533,665	$ -	$ -	$ -
		Mobilization @ 6% of Construction Subtotal	$ 1,772	$ -	$ -	$ 52,318	$ 9,900	$ -	$ 32,020	$ -	$ -	$ -
		Construction Total	**$ 31,308**	**$ -**	**$ -**	**$ 924,292**	**$ 174,900**	**$ -**	**$ 565,684**	**$ -**	**$ -**	**$ -**
		Project Contingency @ 15%	$ 4,696	$ -	$ -	$ 138,644	$ 26,235	$ -	$ 84,853	$ -	$ -	$ -
		Engineering: Contract Documents/Field Rep @ 15%	$ 4,696	$ -	$ -	$ 138,644	$ 26,235	$ -	$ 84,853	$ -	$ -	$ -
		Material Testing During Construction	$ 313	$ -	$ -	$ 9,243	$ 1,749	$ -	$ 5,657	$ -	$ -	$ -
		Project Cost Totals Per Year:	**$ 41,014**	**$ -**	**$ -**	**$ 1,210,823**	**$ 229,119**	**$ -**	**$ 741,047**	**$ -**	**$ -**	**$ -**

NOTES:

1. Estimated costs are based on multi-year construction seasons.
2. Estimated costs are based on historical records of similar types of work.
   Costs may vary due to time of year, local economy, or other factors.
3. Costs assume no hazardous waste and a landfill located within 50 miles.
4. Cost based on normal work week, daylight hours and non-union labor.

APPENDIX B

WALKER
RESTORATION CONSULTANTS

Photo 1

Expansion joint in good condition.

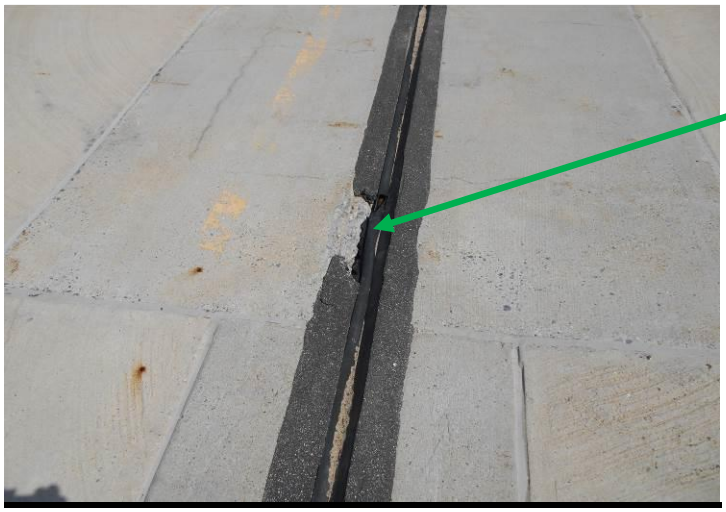


Photo 2

Damaged expansion joint.

Photo 3

Failing sealant at tee to tee joint at precast to cast-in-place wash junction.

Missing sealant.

Photo 4

Adhesive failure of tee to tee sealant.

Photo 5

Scaling of slab surface.

Photo 6

Exposed reinforcing due to lack of cover.

Photo 7

Crack in tee to tee flange above tee stem.

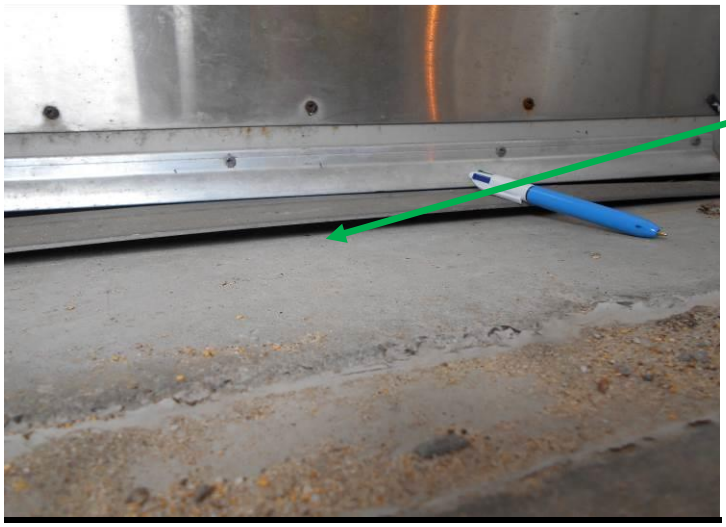
Photo 8

Accumulation of salt and debris at doorway.

Photo 9

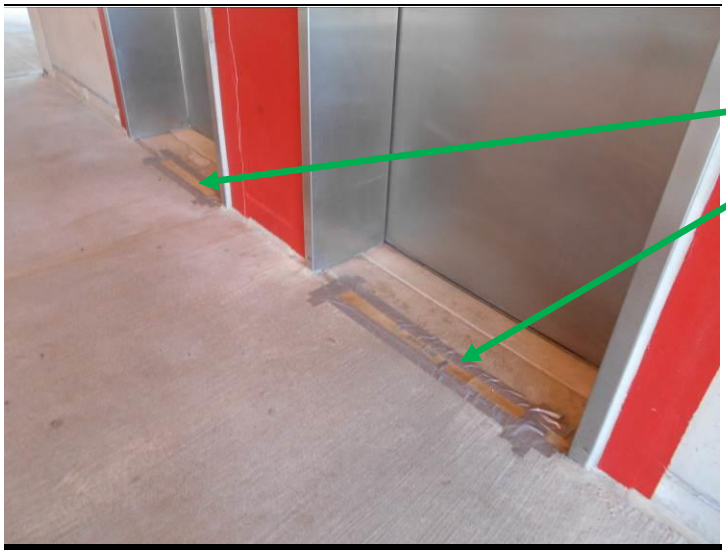
Broken panic hardware.

Photo 10



Damaged threshold.

Photo 11



Temporary patching of joint in elevator threshold.

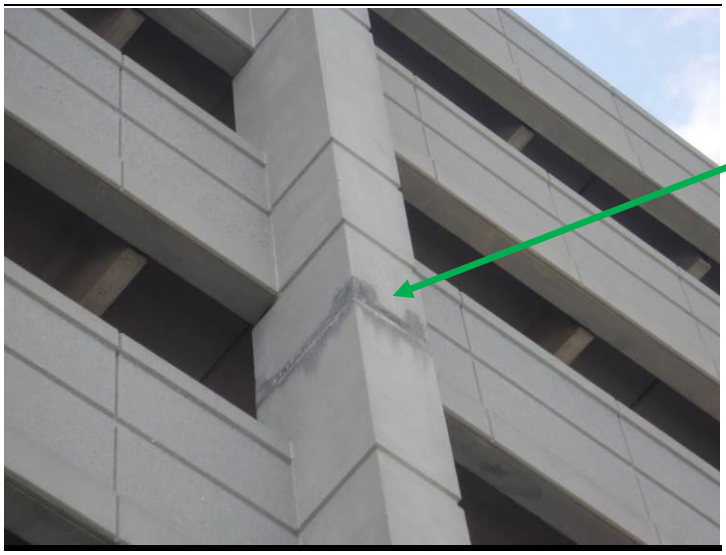
Photo 12

Damaged door.

Photo 13

Spalled spandrel connection.

Photo 14



Leaching at grouted column connection.

Photo 15

Rusting bollard at base.

Photo 16

Fencing detached from frame.

Photo 17

Spandrel cracked welded connection, which is opposite side of damage shown in Photo 14. This welded connection was replaced with slotted angle connection directly above it.

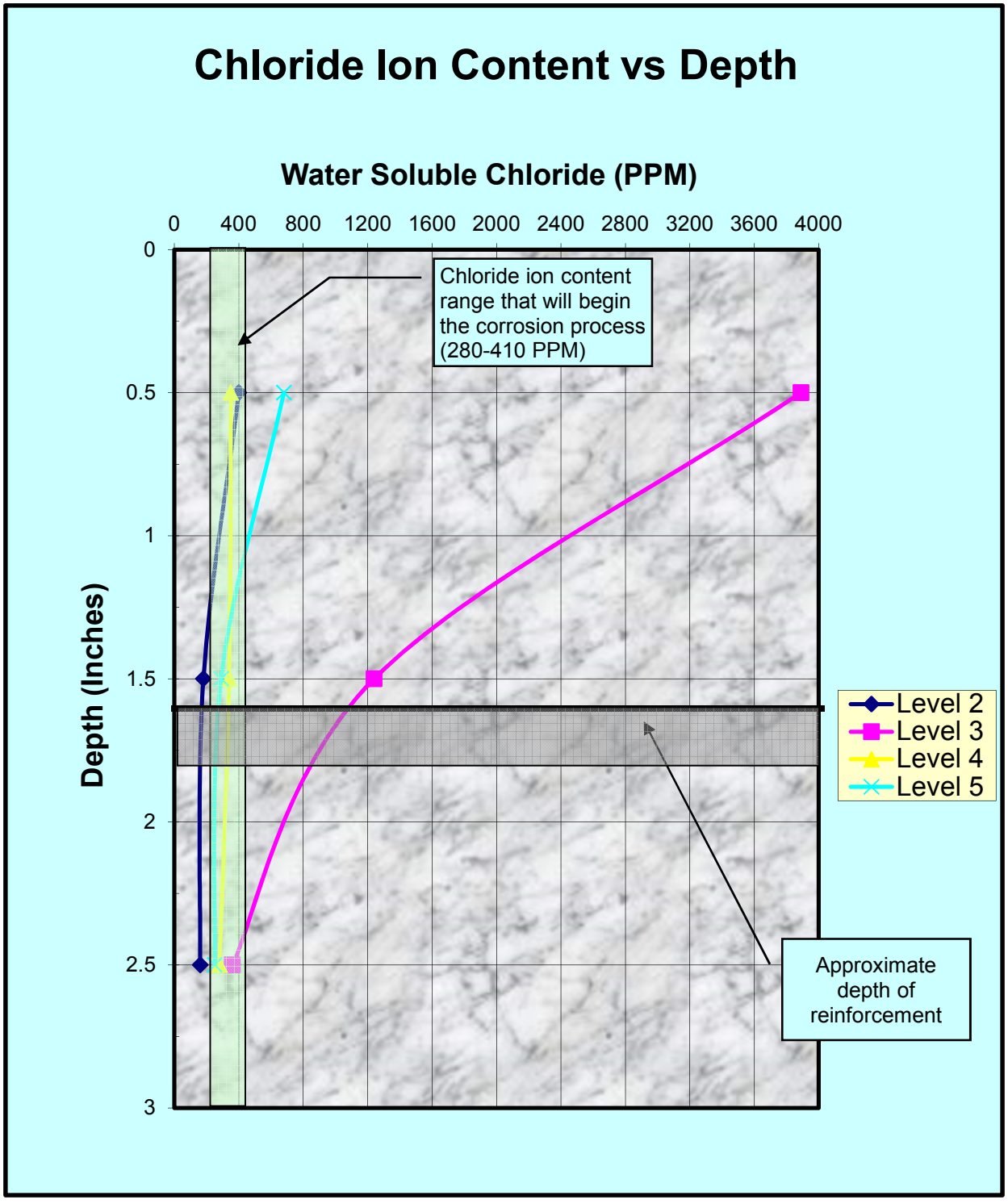
Photo 18

APPENDIX C

WALKER
RESTORATION CONSULTANTS

Project # 14-3944.04
Date Jun-14

PART 1



UNIVERSAL CONSTRUCTION TESTING, Ltd.

Project: Washington Metropolitan Area Transit Authority
Maryland, Virginia & Washington DC

UCT Project No. 14084
Walker Project No. 14-3994.00

Client: Walker Restoration Consultants

Date: May 12, 2014

Table 1.6. **Chloride Content of Concrete**
(Water-Soluble)
AASHTO T 260

Sample Number	Location in Structure	Level tested, inch from top	Chloride ion (CL^-) Content		
			by weight of concrete %	by weight of cement* %	by weight of concrete (ppm)*
New Carrolton Garage					
2	Level 2	0-1	0.040	**0.26**	400
	Intermediate	1-2	0.018	**0.12**	180
		2-3	0.016	**0.11**	160
3	Level 3	0-1	0.389	**2.46**	3890
	Intermediate	1-2	0.124	**0.78**	1240
		2-3	0.036	**0.23**	360
4	Level 4	0-1	0.035	**0.22**	350
	Intermediate	1-2	0.034	**0.21**	340
		2-3	0.028	**0.18**	280
5	Level 5	0-1	0.068	**0.43**	680
	Intermediate	1-2	0.029	**0.18**	290
		2-3	0.025	**0.16**	250
6	Level 6	0-1	0.317	**2.01**	3170
	Intermediate	1-2	0.137	**0.87**	1370
		2-3	0.044	**0.28**	440

Remarks: *) Assumed cement content 600 lbs/cu.yd. and U.W. = 3800 pcy.

UNIVERSAL CONSTRUCTION TESTING

UNIVERSAL CONSTRUCTION TESTING, Ltd.

Project: Washington Metropolitan Area Transit Authority
Maryland, Virginia & Washington DC

UCT Project No. 14084
Walker Project No. 14-3994.00

Client: Walker Restoration Consultants

Date: May 12, 2014

Table 1.6. **Chloride Content of Concrete**
(Water-Soluble)
AASHTO T 260

Sample Number	Location in Structure	Level tested, inch from top	Chloride ion (CL^-) Content		
			by weight of concrete %	by weight of cement* %	by weight of concrete (ppm)*
New Carrolton Garage					
7	Level 7	0-1	0.083	**0.53**	830
	Intermediate	1-2	0.034	**0.22**	340
		2-3	0.030	**0.19**	300
8	Level 8	0-1	0.047	**0.30**	470
	Roof	1-2	0.016	**0.10**	160
		2-3	0.013	**0.08**	130

Remarks: *) Assumed cement content 600 lbs/cu.yd. and U.W. = 3800 pcy.

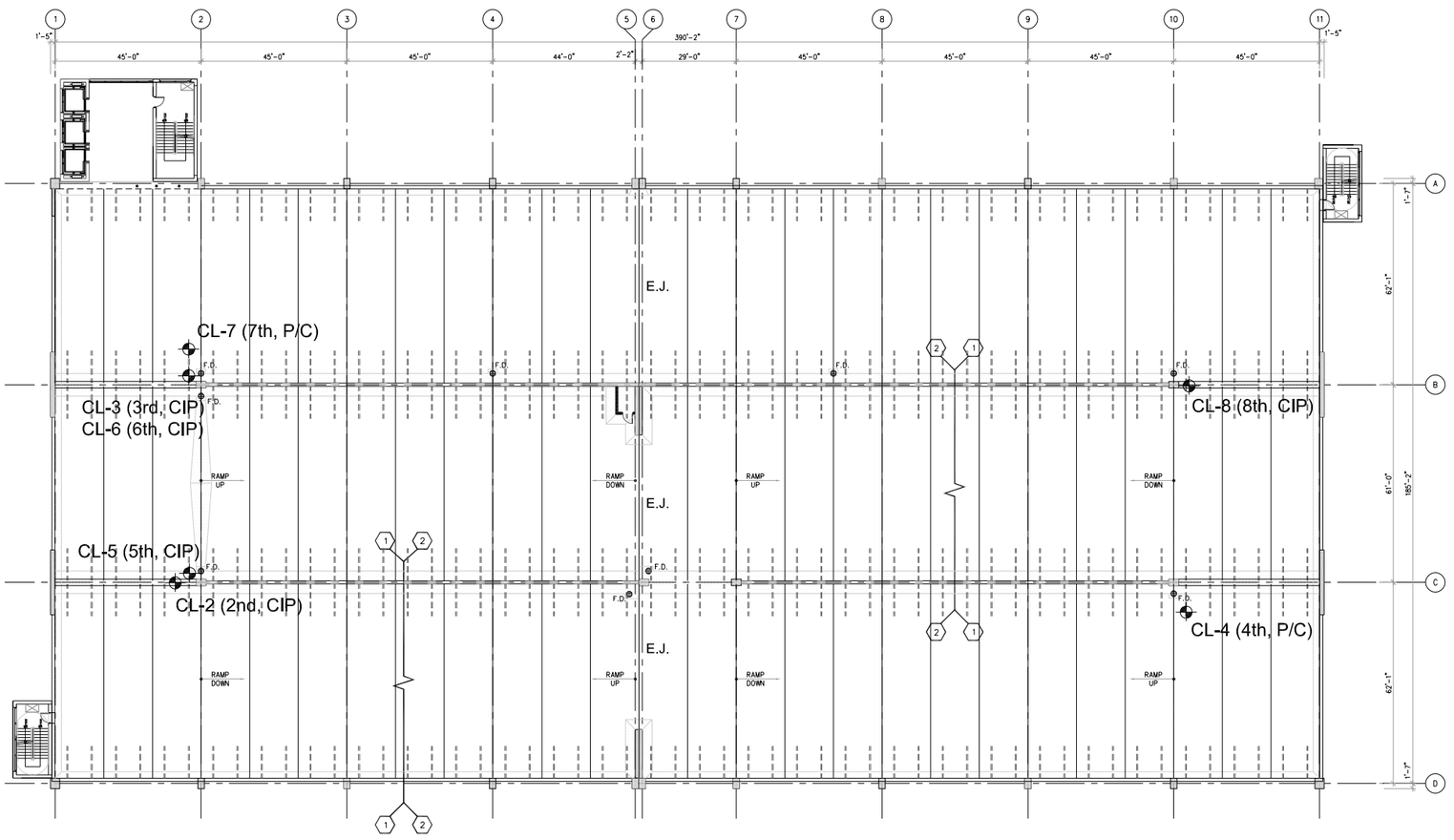
APPENDIX D

WALKER
RESTORATION CONSULTANTS

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY - NEW CARROLLTON GARAGE
HYATTSVILLE, MARYLAND

WALKER PARKING CONSULTANTS

CHLORIDES
SAMPLE LOCATIONS



LEGEND:

CL-1 CONCRETE SAMPLE
THE FIRST NUMBER REFERS TO THE SAMPLE NUMBER. THE SECOND NUMBER REFERS TO THE FLOOR WHERE THE SAMPLE WAS TAKEN. THE FINAL SYMBOL (P/C = PRECAST, CIP = CAST IN PLACE) REFERS TO THE TYPE OF CONCRETE FROM WHICH THE SAMPLE WAS TAKEN. TAKEN 4/14/2014

LEGEND

NORTH

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

R-701

04/03/2014 14-944.00

APPENDIX E

WALKER
RESTORATION CONSULTANTS

Kletsko, Marissa

From: Neiderer, Greg
Sent: Thursday, May 22, 2014 1:47 PM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Stairs, Kathryn; Gross, Jason @ Walker
Subject: 2014 05 22 WMATA New Carrolltown Near Term Actions
Attachments: SAM_1604.jpg; SAM_1582.jpg; SAM_1583.jpg; SAM_1587.jpg; DSCN0550.jpg; DSCN0551.jpg; DSCN0541.jpg; DSCN0542.jpg; DSCN0543.jpg; DSCN0544.jpg; DSCN0545.jpg; DSCN0546.jpg; DSCN0549.jpg

Patrick,

Below are the items observed at New Carrollton that we recommend near term actions:

1. On the roof level, there were two areas where caulk and backer rod were missing entirely, which could be a tripping hazard. They were both near Column Line B between Column Lines 10 and 11. See photo 1582/3.
2. An area of fencing was damaged along the litewall, and could be considered a fall risk. See photo 1587.
3. The exit hardware on the door from the stair tower at D-1 to the exterior was broken and make operating the door difficult.
4. Along Column Line A, the exterior curb is approximately 6" below the t.o. spandrel. With no fencing infilling the spandrel to spandrel gap, this could be considered a fall risk. See photo 1604.
5. The expansion joint top tier near between grid C-D is failing. Photo 541
6. The stair tower at A11 has the following items:
    a. The door on level 7 and top hits floor and does not close all the way. Photo 550
    b. The threshold is loose and bows up on level 6, photo 549
    c. Door is missing panic hardware, sharp edges exposed on level 4, photo 544
    d. Pile of salt in doorway and loose floor spall level 3, photo 543
    e. Caulk joint at landing is failing all levels, photo 545
    f. Floor spall in nosing level 4
7. The main stair/elevator tower has the following:
    a. Missing pull bar on main doors and adjacent pull bar is loose, photo 551
    b. Loose threshold at stair tower door
    c. Light is out on level 7
    d. Missing panic hardware on stair tower door levels 4 and 6
    e. Cardboard taped over joint in front of elevators levels 4 and 5. Photo 546
8. Loose overhead spalls on soffit of each level (< 2 sf) at tee-tee connections, photo 542

Thanks

Gregory J. Neiderer, PE
Principal

Walker Restoration Consultants | **Walker Parking Consultants**
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PRINCE GEORGE'S PLAZA

WALKER
RESTORATION CONSULTANTS

FEBRUARY 2015 14-3944.04

The summary data for the facility is as follows:

Table PRGEO-1: Facility Information Summary

	PRINCE GEORGE'S PLAZA
Location:	6300 Belcrest Road Hyattsville, MD 20782
Overall Condition:	**FAIR**
Current Needs:	**MODERATE**
Chloride Contamination	**MINOR**
Year built:	1993
Supported Levels	3
Levels Below Grade	None
Parking Space Capacity:	1,068
Parking Efficiency:	326 SF/Space
Footprint:	Approximately 320' x 300'
Bridges:	3 Vehicular
Vehicle Circulation:	2 Single Helix
Pedestrian Circulation	4 Stair(s), 2 Elevator(s)
Parking Area: Slab on Grade Total Supported Area Total Parking Area	 38,000 ± SF 310,000 ± SF 348,000 ± SF
Structural System	Post-Tensioned 1-way Beam & Slab
Façade Spandrel Treatment	Cast-in-place with Steel Railing

FACILITY DESCRIPTION

NORTH VIEW

SOUTH VIEW

EAST VIEW

WEST VIEW

PLAN VIEW

FEBRUARY 2015 14-3944.04

EXECUTIVE SUMMARY

This 1993 garage is in fair shape, has minor chloride contamination and has moderate current repair needs

Its scheduled repairs are anticipated to cost:

2018 – Near Term - $1,960,544
2023 – Long-term - $374,098

See Appendix A for cost details.

CRITICAL REPAIRS

The following safety related items requiring urgent action were identified in our 05/22/14 email to Metro:

1. Overhead spalls on stair exterior
2. Overhead spalls on stair soffit
3. Torn expansion joint glands (trip hazard)
4. Unpainted curbs (trip hazard)
5. Handrail not compliant with current code mandated height or spacing
6. Failing doors
7. Ponding water

Please see the above reference email, found in Appendix E, for more detail and recommended actions. We have no further immediate concerns.

NEAR-TERM REPAIRS

Due to the age and condition of the garage we recommend most of the non-critical repairs be completed in 2018, year three of the master repair plan. These near-term repairs include addressing the structural items found including:

1. Remove and replace spalled overhead concrete found on ceilings (soffits), bridge abutments, columns and beams with repair concrete anchored with supplementary embedded steel pins. Monitor this condition at least every 6 months until replacement and remove loose concrete.

RECOMMENDATIONS

2. Repair P/T beam leaching
3. Replace roof level expansion joint glands
4. Repair roof level traffic topping
5. Repair interior level traffic topping
6. Replace stairtower roofs and repair roof slab damage
7. Repair and coat existing floor trench drains
8. Replace existing floor drain piping
9. Replace stairtower door and frame
10. Repair storefront
11. Repaint traffic markings
12. Repair façade handrails to meet current codes

Based on chloride test results, we do not recommend any improvements to protect the floor structural system.

LONG-TERM REPAIRS

Long term repairs include a second round of structural and waterproofing repairs in 2023, five years after the near-term repairs to address continued deterioration of the concrete and the end of the useful life of the waterproofing products. Long-term repairs items include the following:

1. Repair interior level drive lane traffic topping

OBSERVATIONS AND DISCUSSION

CONDITION ASSESSMENT

The following observations were made during a facility walk through on the May 19 to 20, 2014 site visit. Photographs referenced within the observations are found in Appendix B of the report. Observations are immediately followed by a brief discussion of the repair in italics.

1. Roof level floor sealants are in good condition beneath traffic topping and require replacement beyond 10 years. (Photo 1)
2. Interior floor sealants are in good condition beneath traffic topping and require replacement beyond 10 years.
3. Roof level expansion joints are in fair condition and require replacement within 5 years. (Photo 2,3,6)
4. A minor portion of the roof level floor traffic topping is damaged by scrapes and wear which requires repair.
5. Changes in floor elevation- curbs are not readily visually apparent and require painting now with safety yellow paint to emphasize elevations changes

(Photo 4,9,10)

6. Significant but localized beam leaching was observed and requires repair now (Photo 5).
7. The stairtower roof slab soffits were observed to have minor leaching cracks and minor effloresence which require structural repair and waterproofing to address deterioration (Photo 13)
8. A few stair soffits were observed to have moderate cracking and spalling which require structural repair and waterproofing to address deterioration (Photo 11)
9. A moderate amount of the concrete bridge abutment was observed to be leaching and rusting which requires structural repair. (Photo 15)
10. The lowest level storefront is mildly corroded which requires repair now to forestall replacement (Photo 17).
11. The roof and interior level stairtower doors are heavily corroded which requires replacement (Photo 12).
12. A few of the existing floor trench drains have leaching due to water ponding within drains and need structural repair and waterproofing (Photo 7).
13. A moderate portion of the existing floor drain piping is cracked and permits water to leak out into parking areas. (Photo 8)
14. A minor amount of localized ponding was observed and clogged drains need to be cleared of debris. (Photo 4)

MATERIAL TESTING

Concrete powder samples were extracted from floor surfaces of the roof and intermediate supported levels of the parking garage as shown in Appendix C. The chloride content was determined at 3 depths: near the surface (0-1 inch depth), near the design location for top reinforcing steel/tee connections (1 to 2 inch depth), and near the center of the slab (2 to 3 inch depth). Locations were taken in both cast-in-place concrete as well as precast concrete, if present, to determine the extent of chloride contamination in these differing concretes. The results are included in Appendix D. These chloride contents provide an indication of the current and expected future deterioration of the parking structure due to chloride-induced corrosion of the reinforcing steel. A typical threshold chloride value for the onset of corrosion is between 280 and 410 parts per million. The determined values are defined as minor (less than 200

ppm at the 1 to 2 inch depth), moderate (between 200 ppm and 400 ppm at the 1 to 2 inch depth, and large (greater than 400 ppm at the 1 to 2 inch depth. The extent of chloride contamination directly influences our recommended floor surface treatment (nothing, penetrating sealer, traffic topping).

The summary of chlorides test results in Appendix C are;

Level	Depth	Type	PPM
1	1 to 2	CIP	130
2	1 to 2	CIP	110
3	1 to 2	CIP	30
4 (Roof)	1 to 2	CIP	50

APPENDIX A

WALKER
RESTORATION CONSULTANTS

PRINCE GEORGE'S PLAZA GARAGE

Opinion of Probable Cost for Master Repair Plan
Recommended Phasing : 10 Year Program

	Work Item	Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Structural												
	106	P/T Slab Repair	$ 19,394		$ 77,578							
	107	P/T Beam Repair			$ 12,472							
	108	P/T Column Repair			$ 7,800							
	109	Stair Tread Concrete Repair			$ 1,950							
	110	Epoxy Crack Injection										
	111	Masonry Repair										
	113	Repair Loose Bollard										
	115	Structural Repair Allowance @15% (min $1,000.00)	$ 2,909		$ 14,970					$ 1,000		
		Structural Sub-Total	**$ 22,304**	**$ -**	**$ 114,770**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**
Waterproofing												
	201	Facade Sealant Replacement - P/T										
	203	Cove Sealant Replacement - P/T Roof										
	204	Cove Sealant Replacement - P/T Covered Levels										
	207	Floor Sealant Replacement - P/T Roof										
	208	Floor Sealant Replacement - P/T Covered Levels										
	211	Rout and Seal Cracks										
	212	Traffic Topping Repair			$ 968,750					$ 242,188		
	213	Traffic Topping - New Installation										
	214	Concrete Sealer										
	215	Masonry Sealer										
	216	Expansion Joint Replacement - Roof	$ 10,781		$ 32,344							
	217	Expansion Joint Replacement - Covered Levels										
	218	Caulk Handrail Bases										
	221	Waterproofing Repair Allowance @ 10% (min $1,000.00)	$ 1,078		$ 100,109					$ 24,219		
		Waterproofing Sub-Total	**$ 11,859**	**$ -**	**$ 1,101,203**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 266,406**	**$ -**	**$ -**
Mechanical												
	301	Repair Leaking Drainage Piping			$ 28,125							
	302	New Drain & Piping	$ 4,813									
	303	Repair Existing Trench Drains			$ 24,750							
	305	Mechanical Allowance @ 10% (min $1,000.00)	$ 1,000		$ 5,288					$ 1,000		
		Mechanical Sub-Total	**$ 5,813**	**$ -**	**$ 58,163**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**
Electrical												
	401	PARC System Replacement				$ 150,000						
	403	Electrical Allowance @ 10% (min $1,000.00)	$ 1,000		$ 1,000	$ 15,000				$ 1,000		
		Electrical Sub-Total	**$ 1,000**	**$ -**	**$ 1,000**	**$ 165,000**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**
Miscellaneous												
	501	Paint Curbs, Wheelstops and Islands Safety Yellow	$ 4,785									
	502	Repaint Traffic Markings			$ 21,750							
	503	Clean and Paint Metal Pan Stairs										
	504	Repair Loose Stair Nosings										
	505	Replace Door, Frame and Hardware	$ 4,375									
	506	Clean and Paint Door and Door Frame										
	507	Repaint Stair Railings										
	508	Railing Infill for Excessive Gap	$ 498,125									
	509	Install Fencing under Lowest Stair Run										
	510	Replace Stair Tower Roof			$ 25,000							
	511	Repair Rusting Storefront			$ 90,000							
		Miscellaneous Sub-Total	**$ 507,285**	**$ -**	**$ 136,750**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
		Construction Subtotal	$ 548,260	$ -	$ 1,411,885	$ 165,000	$ -	$ -	$ -	$ 269,406	$ -	$ -
		Mobilization @ 6% of Construction Subtotal	$ 32,896	$ -	$ 84,713	$ 9,900	$ -	$ -	$ -	$ 16,164	$ -	$ -
		Construction Total	**$ 581,156**	**$ -**	**$ 1,496,598**	**$ 174,900**	**$ -**	**$ -**	**$ -**	**$ 285,571**	**$ -**	**$ -**
		Project Contingency @ 15%	$ 87,173	$ -	$ 224,490	$ 26,235	$ -	$ -	$ -	$ 42,836	$ -	$ -
		Engineering: Contract Documents/Field Rep @ 15%	$ 87,173	$ -	$ 224,490	$ 26,235	$ -	$ -	$ -	$ 42,836	$ -	$ -
		Material Testing During Construction	$ 5,812	$ -	$ 14,966	$ 1,749	$ -	$ -	$ -	$ 2,856	$ -	$ -
		Project Cost Totals Per Year:	**$ 761,314**	**$ -**	**$ 1,960,544**	**$ 229,119**	**$ -**	**$ -**	**$ -**	**$ 374,098**	**$ -**	**$ -**

NOTES:

1. Estimated costs are based on multi-year construction seasons.
2. Estimated costs are based on historical records of similar types of work. Costs may vary due to time of year, local economy, or other factors.
3. Costs assume no hazardous waste and a landfill located within 50 miles.
4. Cost based on normal work week, daylight hours and non-union labor.

APPENDIX B

WALKER
RESTORATION CONSULTANTS

Damaged traffic topping at trench drain.

Photo 1

Expansion joint in fair condition.

Photo 2

Damaged expansion joint.

Photo 3

Ponding

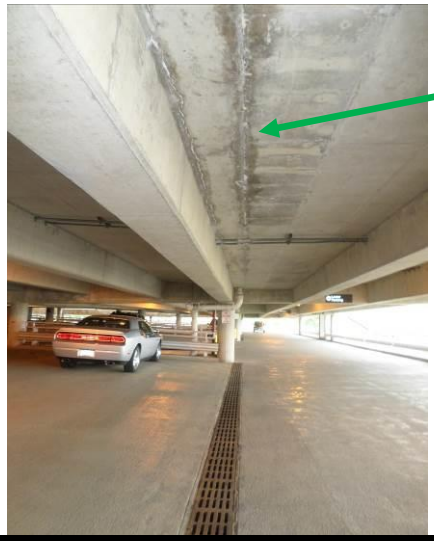
Photo 4

Leaching at P/T tendon cap at end of beam.

Photo 5

Expansion joint soffit shows no evidence of significant leaking.

Photo 6



Leaching at trench drain soffit.

Photo 7

Rusted and split drain piping.

Photo 8

Unpainted curbs. Curbs are recommended to be painted yellow.

Dirt spills over curb and fills into vehicular and pedestrian travel paths.

Photo 9

Black stair nosings provide color contrast so no yellow paint is recommended.

Unpainted curb at stair tower recommended to be painted yellow.

Photo 10

Spall at stair soffit with exposed reinforcing.

Photo 11

Heavily rusted stair tower door.

Photo 12

Photo 13

Leaching at stair tower soffit.

Photo 14

Transition between S.O.G. to bridge.

Photo 15

Rusting and leaching at bridge abutment.

Train station underneath parking garage.

Photo 16

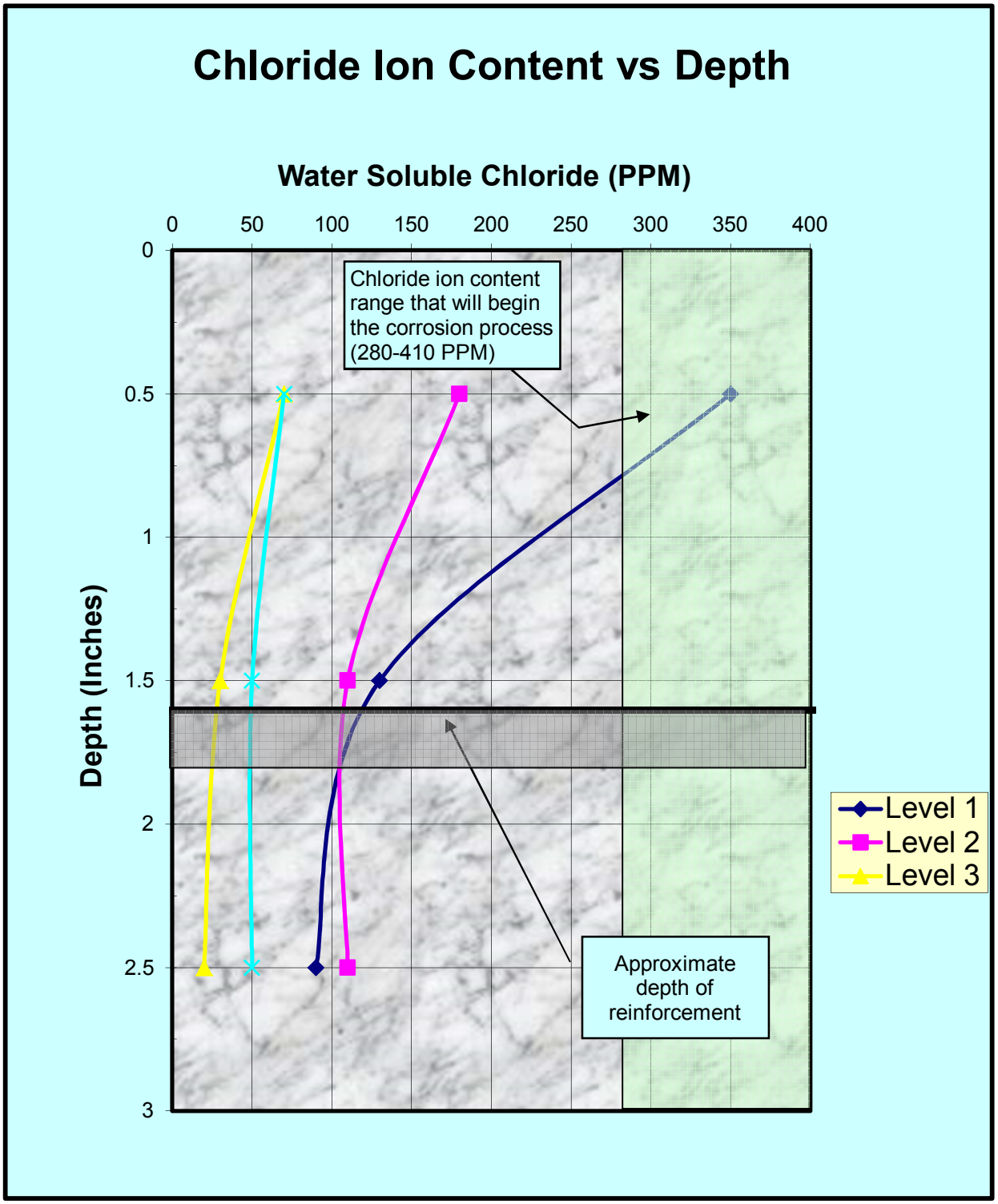
Exterior façade showing rusting storefront.

Photo 17

APPENDIX C

WALKER
RESTORATION CONSULTANTS

Project # 14-3944.04
Date Jun-14



UNIVERSAL CONSTRUCTION TESTING, Ltd.

Project: Washington Metropolitan Area Transit Authority
Maryland, Virginia & Washington DC

UCT Project No. 14084
Walker Project No. 14-3994.00

Client: Walker Restoration Consultants

Date: May 12, 2014

Table 1.7. **Chloride Content of Concrete**
(Water-Soluble)
AASHTO T 260

Sample Number	Location in Structure	Level tested, inch from top	Chloride ion (CL^-) Content		
			by weight of concrete %	by weight of cement* %	by weight of concrete (ppm)*
Prince George's Plaza Garage					
1	Level 1	0-1	0.035	**0.22**	350
	Intermediate	1-2	0.013	**0.08**	130
		2-3	0.009	**0.06**	90
2	Level 2	0-1	0.018	**0.11**	180
	Intermediate	1-2	0.011	**0.07**	110
		2-3	0.011	**0.07**	110
3	Level 3	0-1	0.007	**0.05**	70
	Intermediate	1-2	0.003	**0.02**	30
		2-3	0.002	**0.01**	20
4	Level 4	0-1	0.007	**0.05**	70
	Roof	1-2	0.005	**0.04**	50
		2-3	0.005	**0.04**	50

Remarks: *) Assumed cement content 600 lbs/cu.yd. and U.W. = 3800 pcy.

UNIVERSAL CONSTRUCTION TESTING

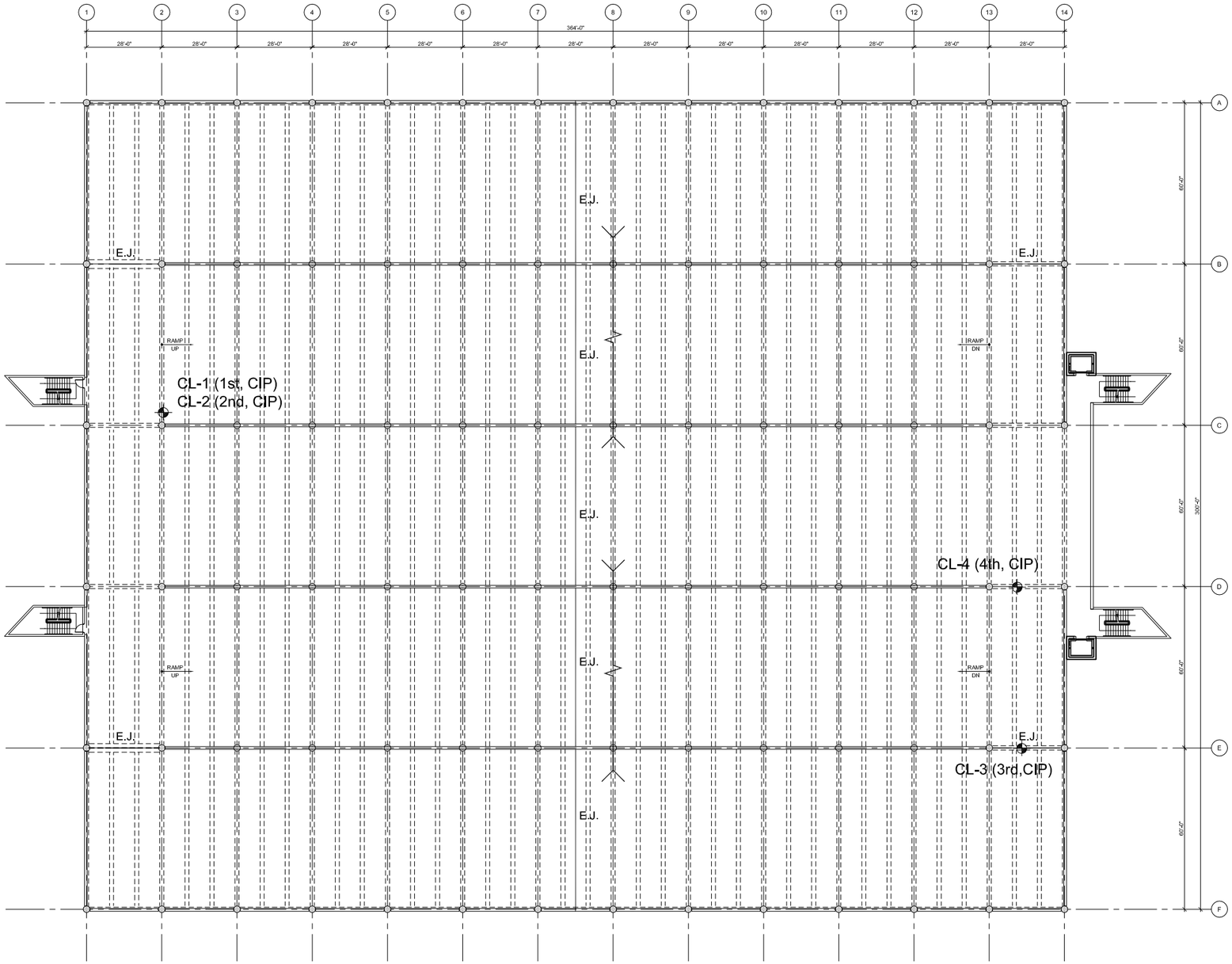
APPENDIX D

WALKER
RESTORATION CONSULTANTS

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY - PRINCE GEORGE'S PLAZA GARAGE

HYATTSVILLE, MARYLAND

WALKER PARKING CONSULTANTS



CHLORIDES SAMPLE LOCATIONS

LEGEND:

CL-1 CONCRETE SAMPLE
THE FIRST NUMBER REFERS TO THE SAMPLE NUMBER. THE SECOND NUMBER REFERS TO THE FLOOR WHERE THE SAMPLE WAS TAKEN. THE FINAL SYMBOL (P/C = PRECAST, CIP = CAST IN PLACE) REFERS TO THE TYPE OF CONCRETE FROM WHICH THE SAMPLE WAS TAKEN. TAKEN 4/14/2014

LEGEND

NORTH

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

R-701

04/03/2014 14-944.00

APPENDIX E

WALKER
RESTORATION CONSULTANTS

Kletsko, Marissa

From: Neiderer, Greg
Sent: Thursday, May 22, 2014 2:24 PM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Gross, Jason @ Walker; Stairs, Kathryn
Subject: 2014 05 22 WMATA Prince George's Plaza Near Term Actions
Attachments: SAM_1650.jpg; SAM_1612.jpg; SAM_1640.jpg; DSCN0586.jpg; DSCN0556.jpg; DSCN0566.jpg; DSCN0585.jpg

Patrick,

Below are the items we observed on 5/19 and 20 at Prince George's Plaza that we recommend near term actions:

1. Damage to expansion joint nosing could pose a tripping hazard. Locations typically on the roof level. See photo 1612.
2. Mutiple areas of loose overhead concrete on stair adjacent to the elevator. See photo 1640.
3. Small area (1-2 s.f.) of spalling on the exterior of the stair adjacent to the elevator on the track side, level 3 near C.L. C-14. See photo 1650.
4. The railings along portions of the garage are on top of a 6" curb, and are 36" tall. From t.o. slab, this assembly meets code, but you could stand on the curb, thus reducing the railing height. All railings exceed the 4" opening requirements per current codes.
5. Ponding water was observed Along grid E near grid 8 exterior bay 4th level. Photo 556
6. The expansion joint is torn on top tier in center bay. Photo 586
7. The storefront is rusted through at the base in both stair towers on grid 1 top tier. Photo 566
8. The same stair tower doors have knocks and not levers which are not per current code. Photo 585
9. Curbs in front of all stair towers are not painted yellow.

Please address the soffit spalls by removal, repair the expansion joint damage, fill the stair spalls and unclog the floor drains. While the railings may have met codes at the time of construction, they do not meet current codes. They may be "grandfathered" but we do not know if that is the case in this instance. The storefront should be scheduled for replacement or system-wide rehab.

Thanks

Gregory J. Neiderer, PE
Principal

Walker Restoration Consultants | **Walker Parking Consultants**
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www.walkerrestoration.com | www.walkerparking.com

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Thanks,

Kathryn E. Stairs, P.E.
Project Manager

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www.walkerrestoration.com | www.walkerparking.com







RHODE ISLAND AVENUE

WALKER
RESTORATION CONSULTANTS

FEBRUARY 2015 14-3944.04

The summary data for the facility is as follows:

Table RDISL-1: Facility Information Summary

	RHODE ISLAND AVE - BRENTWOOD
Location:	919 Rhode Island Avenue, NE Washington DC 20018
Overall Condition:	**GOOD**
Current Needs:	**MINOR**
Chloride Contamination	**MINOR**
Year built:	2012
Supported Levels	3
Levels Below Grade	0
Parking Space Capacity:	223
Parking Efficiency:	406 SF/Space
Footprint:	Approximately 204' x 127'
Bridges:	None
Vehicle Circulation:	Single Helix
Pedestrian Circulation	2 Stair(s), 2 Elevator(s)
Parking Area: Slab on Grade Total Supported Area Total Parking Area	 25,900 ± SF 64,700 ± SF 90,600 ± SF
Structural System	Precast Un-topped Double Tee
Façade Spandrel Treatment	Precast

FACILITY DESCRIPTION

NORTH VIEW

SOUTH VIEW

EAST VIEW

WEST VIEW

PLAN VIEW

FEBRUARY 2015 14-3944.04

EXECUTIVE SUMMARY

This 2012 garage is in good shape, has minor chloride contamination and has minor current repair needs

Its scheduled repairs are anticipated to cost:

2020 – Near Term - $36,467
2023 – Long-term - $61,028

See Appendix A for cost details.

CRITICAL REPAIRS

The following safety related items requiring urgent action were identified in our 3/25/14 and 3/28/14 emails to Metro:

1. Overhead spall on stair tower facade
2. Sidewalk slab holes

Please see the above reference emails, found in Appendix E, for more detail and recommended actions. We have no further immediate concerns.

NEAR-TERM REPAIRS

Due to the age and condition of the garage we recommend most of the non-critical repairs be completed in 2020, year five of the master repair plan. These near-term repairs include addressing the structural items found including:

1. Repair floor slab cracks
2. Clean and paint floor drains and piping
3. Repaint curbs
4. Repaint stairtower nosing

Based on chloride test results, we recommend no improvements to protect the floor structural system due to the low chloride content:

RECOMMENDATIONS

FEBRUARY 2015 14-3944.04

LONG-TERM REPAIRS

Long term repairs include a second round of structural and waterproofing repairs in 2023, three years after the near-term repairs to address continued deterioration of the concrete and the end of the useful life of the waterproofing products. Long-term repairs items include the following:

1. Replace roof level floor sealants
2. Replace roof level expansion joint glands

CONDITION ASSESSMENT

OBSERVATIONS AND DISCUSSION

The following observations were made during a facility walk through on the March 24 to 26, 2014 site visit. Photographs referenced within the observations are found in Appendix B of the report. Observations are immediately followed by a brief discussion of the repair in italics.

1. Roof level floor sealants are in good condition and require replacement within 10 years. (Photo 1)
2. Interior floor sealants are in good condition and require replacement beyond 10 years.
3. Roof level expansion joints are in good condition and require replacement beyond 10 years.
4. Interior level expansion joints are in good condition and require replacement beyond 10 years.
5. Changes in floor elevation- curbs, are not readily visually apparent and require painting now with safety yellow paint to emphasize elevations changes (Photo 7)
6. Steps have black nosings which identify elevation changes and therefore do not need yellow paint (Photo 6).
7. Minor stair tower façade delaminations was observed and loose concrete requires removal now. (Photo 8,9)
8. A few double tee floor slabs were observed to have cracking which requires waterproofing repair (Photo 2, 3).
9. A moderate portion of the existing floor drain piping is rusted and requires cleaning and painting. (Photo 4,5)

FEBRUARY 2015 14-3944.04

MATERIAL TESTING

Concrete powder samples were extracted from floor surfaces of the roof and intermediate supported levels of the parking garage as shown in Appendix C. The chloride content was determined at 3 locations: near the surface (0-1 inch depth), near the design location for top reinforcing steel/tee connections (1 to 2 inch depth), and near the center of the slab (2 to 3 inch depth). Locations were taken in both cast-in-place concrete as well as precast concrete, if present, to determine the extent of chloride contamination in these differing concretes. The results are included in Appendix D. These chloride contents provide an indication of the current and expected future deterioration of the parking structure due to chloride-induced corrosion of the reinforcing steel. A typical threshold chloride value for the onset of corrosion is between 280 and 410 parts per million. The determined values are defined as minor (less than 200 ppm at the 1 to 2 inch depth), moderate (between 200 ppm and 400 ppm at the 1 to 2 inch depth, and large (greater than 400 ppm at the 1 to 2 inch depth. The extent of chloride contamination directly influences our recommended floor surface treatment (nothing, penetrating sealer, traffic topping).

The summary of chlorides test results in Appendix C are;

Level	Depth	Type	PPM
2	1 to 2	CIP	60
3	1 to 2	P/C	90
4 (Roof)	1 to 2	CIP	30

APPENDIX A

WALKER
RESTORATION CONSULTANTS

RHODE ISLAND AVENUE GARAGE

Opinion of Probable Cost for Master Repair Plan
Recommended Phasing : 10 Year Program

	Work Item	Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Structural												
	101	Precast Slab Repair	$ 946									
	102	Precast Tee Stem Repair										
	103	Precast Beam Repair										
	104	Precast Shear Connector Repair										
	105	Precast Column/Wall Repair	$ 2,518									
	109	Stair Tread Concrete Repair										
	110	Epoxy Crack Injection										
	111	Masonry Repair										
	112	Replace Double Tee Bearing Pad										
	113	Repair Loose Bollard										
	114											
	115	Structural Repair Allowance @15% (min $1,000.00)	$ 1,000				$ 1,000			$ 1,000		
		Structural Sub-Total	**$ 4,464**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**
Waterproofing												
	202	Façade Sealant Replacement - Precast										
	205	Cove Sealant Replacement - Precast Roof								$ 7,620		
	206	Cove Sealant Replacement - Precast Covered Levels										
	209	Floor Sealant Replacement - Precast Roof								$ 27,881		
	210	Floor Sealant Replacement - Precast Covered Levels										
	211	Rout and Seal Cracks					$ 12,188					
	212	Traffic Topping Repair										
	213	Traffic Topping - New Installation										
	214	Concrete Sealer										
	215	Masonry Sealer										
	216	Expansion Joint Replacement - Roof								$ 1,725		
	217	Expansion Joint Replacement - Covered Levels										
	218	Caulk Handrail Bases										
	219											
	220											
	221	Waterproofing Repair Allowance @ 10% (min $1,000.00)	$ 1,000				$ 1,219			$ 3,723		
		Waterproofing Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ 13,406**	**$ -**	**$ -**	**$ 40,949**	**$ -**	**$ -**
Mechanical												
	301	Repair Leaking Drainage Piping										
	302	New Drain & Piping										
	303	Repair Existing Trench Drains										
	304	Clean and Paint Floor Drains & Piping					$ 3,609					
	305	Mechanical Allowance @ 10% (min $1,000.00)	$ 1,000				$ 1,000			$ 1,000		
		Mechanical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ 4,609**	**$ -**	**$ -**	**$ 1,000**	**$ -**	**$ -**
Electrical												
	401	PARC System Replacement						$ 150,000				
	403	Electrical Allowance @ 10% (min $1,000.00)	$ 1,000				$ 1,000	$ 15,000		$ 1,000		
		Electrical Sub-Total	**$ 1,000**	**$ -**	**$ -**	**$ -**	**$ 1,000**	**$ 165,000**	**$ -**	**$ 1,000**	**$ -**	**$ -**
Miscellaneous												
	501	Paint Curbs, Wheelstops and Islands Safety Yellow					$ 1,246					
	502	Repaint Traffic Markings										
	503	Clean and Paint Stair Tower Nosings					$ 5,000					
	504	Repair Loose Stair Nosings										
	505	Replace Door, Frame and Hardware										
	506	Clean and Paint Door and Door Frame										
	507	Repaint Stair Railings										
	508	Railing Infill for Excessive Gap										
	509	Install Fencing under Lowest Stair Run										
	510	Replace Stair Tower Roof										
	511	Repair Broken Handrail										
	512											
		Miscellaneous Sub-Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ 6,246**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
		Construction Subtotal	$ 7,464	$ -	$ -	$ -	$ 26,261	$ 165,000	$ -	$ 43,949	$ -	$ -
		Mobilization @ 6% of Construction Subtotal	$ 448	$ -	$ -	$ -	$ 1,576	$ 9,900	$ -	$ 2,637	$ -	$ -
		Construction Total	**$ 7,912**	**$ -**	**$ -**	**$ -**	**$ 27,837**	**$ 174,900**	**$ -**	**$ 46,586**	**$ -**	**$ -**
		Project Contingency @ 15%	$ 1,187	$ -	$ -	$ -	$ 4,176	$ 26,235	$ -	$ 6,988	$ -	$ -
		Engineering: Contract Documents/Field Rep @ 15%	$ 1,187	$ -	$ -	$ -	$ 4,176	$ 26,235	$ -	$ 6,988	$ -	$ -
		Material Testing During Construction	$ 79	$ -	$ -	$ -	$ 278	$ 1,749	$ -	$ 466	$ -	$ -
		Project Cost Totals Per Year:	**$ 10,365**	**$ -**	**$ -**	**$ -**	**$ 36,467**	**$ 229,119**	**$ -**	**$ 61,028**	**$ -**	**$ -**

NOTES:

1. Estimated costs are based on multi-year construction seasons.
2. Estimated costs are based on historical records of similar types of work. Costs may vary due to time of year, local economy, or other factors.
3. Costs assume no hazardous waste and a landfill located within 50 miles.
4. Cost based on normal work week, daylight hours and non-union labor.

APPENDIX B

WALKER
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Top level sealant in good condition

Photo 1

Cracked double tee floor slab.

Photo 2

Leaching through cracked double tee floor slab.

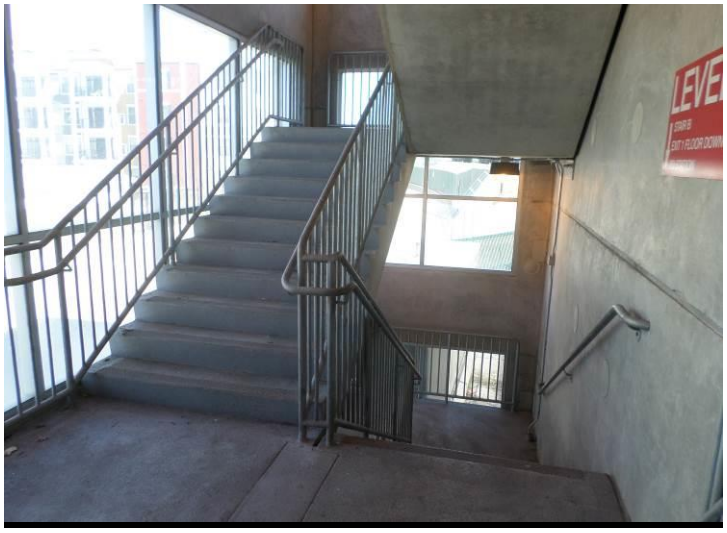
Photo 3

Ponding at floor drain.

Photo 4

Rusting of floor drain and piping.

Photo 5

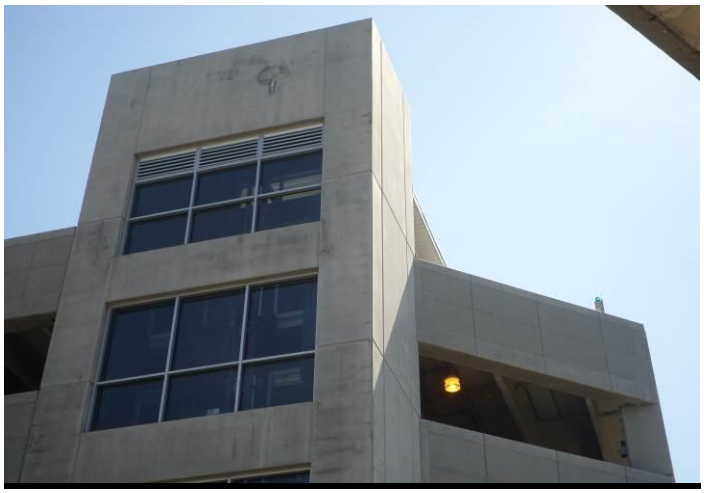


Stairs are in good condition. Black stair nosings provide color contrast so no yellow paint is recommended.

Photo 6

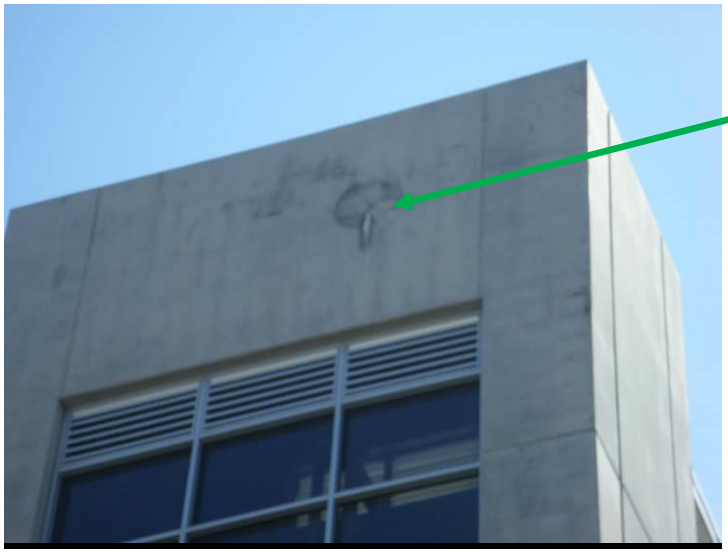
Uncovered hole in sidewalk, and unpainted curb. Curbs are recommended to be painted yellow.

Photo 7



Façade of elevator tower.

Photo 8



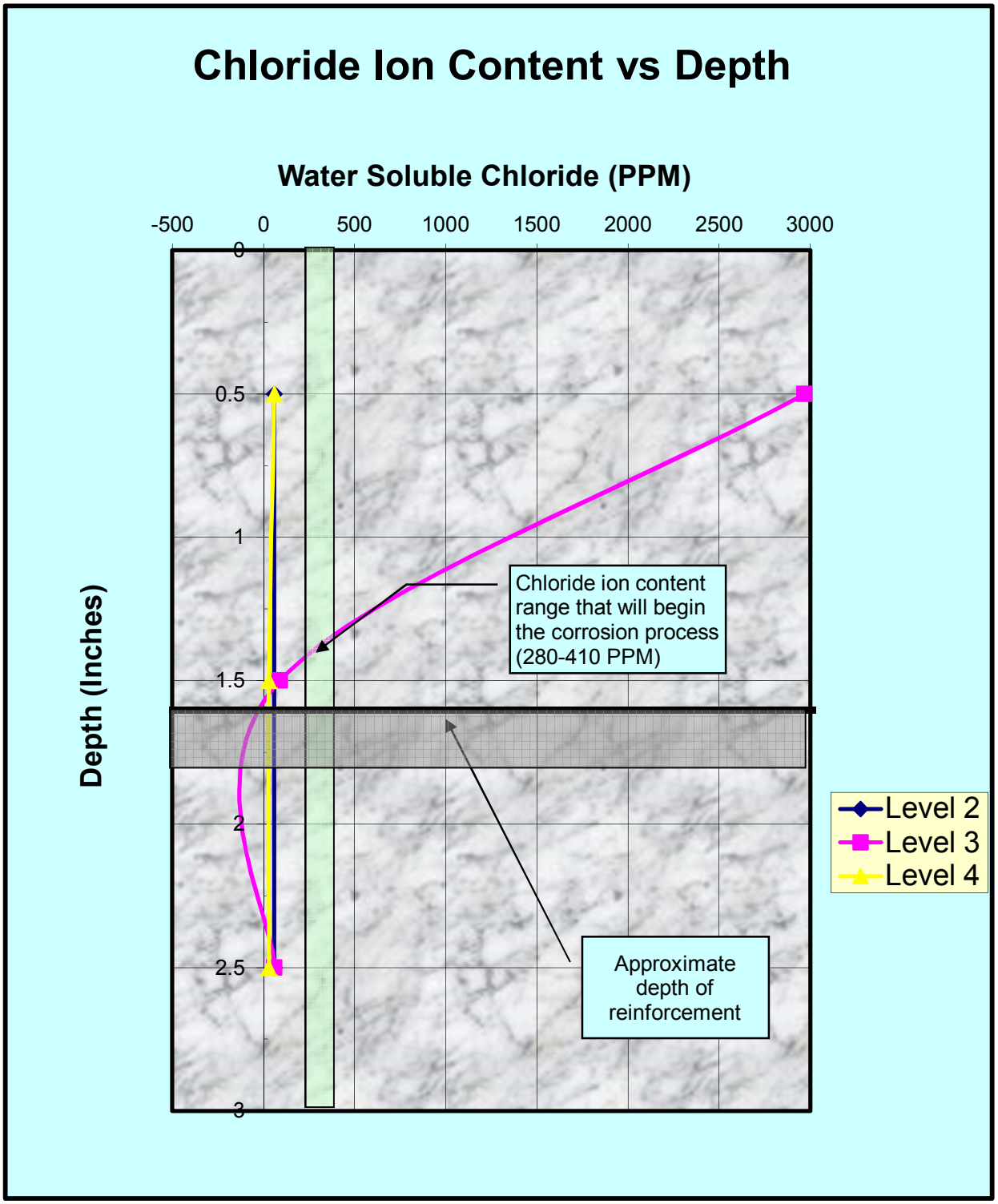
Leaching through façade, spall on stair tower.

Photo 9

APPENDIX C

WALKER
RESTORATION CONSULTANTS

Project # 14-3944.04
Date Jun-14



UNIVERSAL CONSTRUCTION TESTING, Ltd.

Project: Washington Metropolitan Area Transit Authority
Maryland, Virginia & Washington DC

UCT Project No. 14066
Walker Project No. 14-3994.00

Client: Walker Restoration Consultants

Date: April 14, 2014

Table 1.5. **Chloride Content of Concrete**
(Water-Soluble)
AASHTO T 260

Sample Number	Location in Structure	Level tested, inch from top	Chloride ion (CL^-) Content		
			by weight of concrete %	by weight of cement* %	by weight of concrete (ppm)*
Rhode Island Ave. Garage					
2	Level 2	0-1	0.006	**0.04**	60
		1-2	0.006	**0.04**	60
		2-3	0.006	**0.04**	60
3	Level 3	0-1	0.297	**1.88**	2970
		1-2	0.009	**0.06**	90
		2-3	0.006	**0.04**	60
4	Level 4	0-1	0.006	**0.04**	60
	Roof	1-2	0.003	**0.02**	30
		2-3	0.003	**0.02**	30

Remarks: *) Assumed cement content 600 lbs/cu.yd. and U.W. = 3800 pcy.

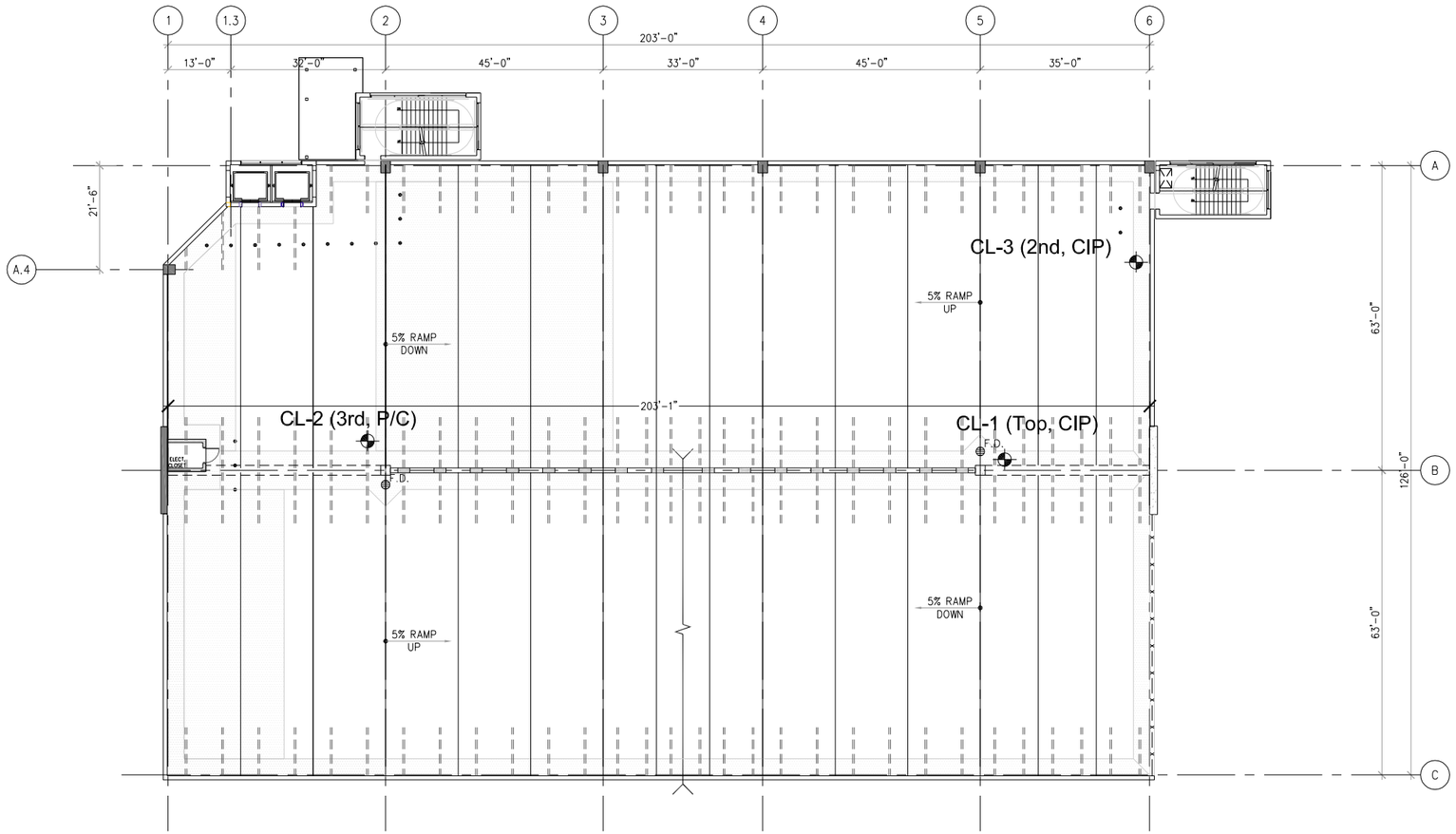
APPENDIX D

WALKER
RESTORATION CONSULTANTS

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY - RHODE ISLAND AVENUE GARAGE
WASHINGTON, DC

WALKER PARKING CONSULTANTS

CHLORIDES
SAMPLE LOCATIONS



LEGEND:

CL-1 CONCRETE SAMPLE
THE FIRST NUMBER REFERS TO THE SAMPLE NUMBER. THE SECOND NUMBER REFERS TO THE FLOOR WHERE THE SAMPLE WAS TAKEN. THE FINAL SYMBOL (P/C = PRECAST, CIP = CAST IN PLACE) REFERS TO THE TYPE OF CONCRETE FROM WHICH THE SAMPLE WAS TAKEN. TAKEN 3/24/2014

LEGEND

NORTH

Scale: 3/32" = 1' - 0"

R-701

04/03/2014 14-844.00

APPENDIX E

WALKER
RESTORATION CONSULTANTS

Kletsko, Marissa

From: Neiderer, Greg
Sent: Tuesday, March 25, 2014 5:50 AM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim; Stairs, Kathryn; Gross, Jason @ Walker
Subject: 2014 03 25 Rhode Island Station SideWalk Tripping Hazard
Attachments: 2014 03 24 WMATA Rhode Island GJN 22.jpg; 2014 03 24 WMATA Rhode Island GJN 21.jpg

Patrick,

While the sidewalk outside of the garage footprint is outside our scope of work we did observe within this sidewalk a tripping hazard. There is a 4 inch diameter threaded pipe flush with the side walk (it appears to be a monitoring well, filling pipe for an underground tank) that should have a threaded cap in it and the cap is missing. We recommend you replace the cap. Please see attached photo for location and description.

Thanks

Gregory J. Neiderer, PE
Principal

Walker Restoration Consultants | Walker Parking Consultants
565 East Swedesford Road, Suite 300 | Wayne, PA 19087
610.995.0260 x 1408 (Office) | 610.659.6967 (Cell) | 610.995.0261 (Fax) www.walkerrestoration.com | www.walkerparking.com

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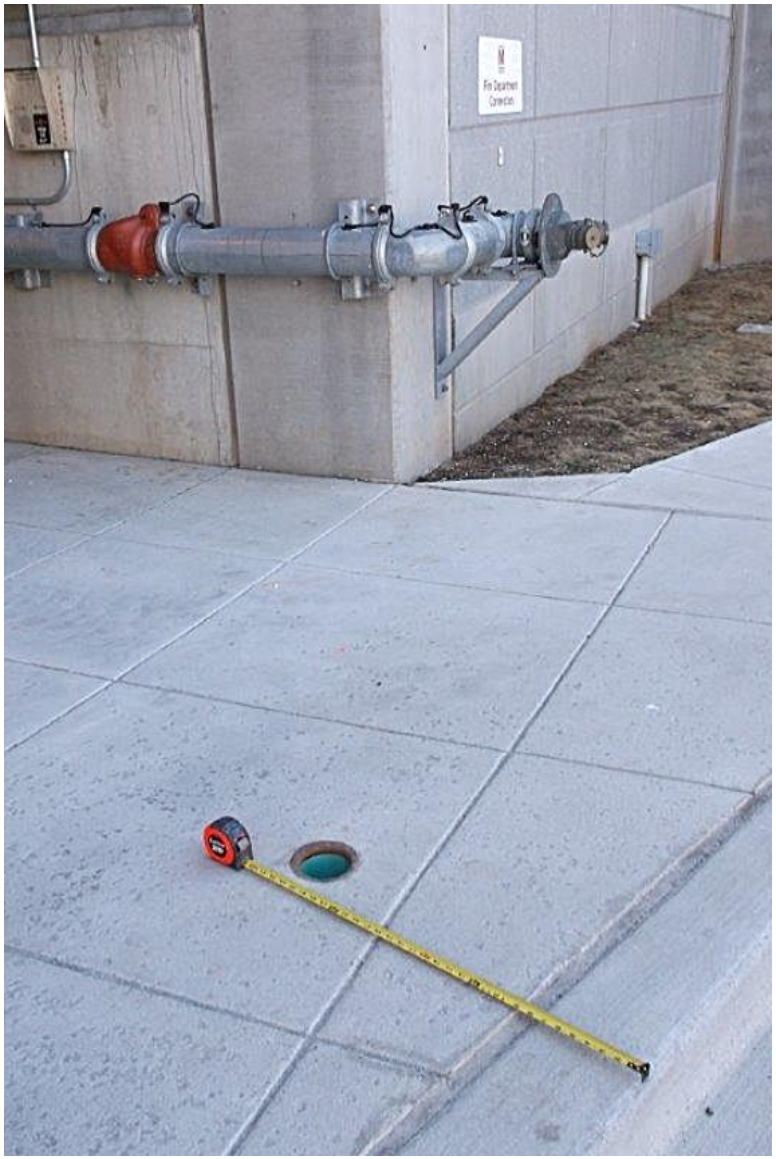
STOP



Kletsko, Marissa

From: Neiderer, Greg
Sent: Friday, March 28, 2014 3:37 PM
To: Patrick Schmitt @ WMATA Pkg
Cc: Rogers, Phillip @ WMATA Pkg; Pudleiner, Jim
Subject: 2014 03 28 WMATA Rhode Island Garage Stair/Elevator Tower Leaching Concrete
Attachments: 2014 03 24 Rhode Island KES 4.jpg; 2014 03 24 Rhode Island KES 3.jpg

Patrick,

On Tuesday we observed a leaching spall on the star/elevator tower which, based on the visual information, is not an immediate hazard, but should be repaired this summer. The attached photos show the location of the spall.

Gregory J. Neiderer, PE
Principal

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