



Massachusetts Bay Transportation  
Authority

Design & Construction Department

# Lessons Learned Management Response: Construction

Compiled By Project Controls

## Lessons Learned Management Response - Construction

I.D. #	Item No.	Classification	Brief Description	Recommendation	Management Brief Action Plan
C.BR12.1	1	Bridge	confirm condition of utilities during design phases	identify buried utilities; identify condition by performing visual camera inspection during design	should be done in early phases of design; at PDG's have a specific focus on utilities; invite utility companies to PDG's; include this requirement in upcoming PM Manual; visual camera inspection to be done on an as-needed-basis
C.BR12.2	1	Bridge	Contech Pre-cast walls	consider using contech pre-cast walls for projects with over 200' of retaining walls; saves time and money	Agree where applicable
C.BR12.3	1	Bridge	R.O.W and construction site on contract drawings	real estate/document with property owners, adjacent to project site should be included as part of the Appendix to contract spec.	Agree; plans should identify limitations; will make a note in PM Manual
C.BR12.4	1	Bridge	Rapid Bridge Construction	Constructing structural elements of bridge on site, prior to installation, allowed for the rapid bridge construction to be performed effectively and efficiently ahead of schedule	Agree, implement where applicable

## Lessons Learned Management Response - Construction

I.D. #	Item No.	Classification	Brief Description	Recommendation	Management Brief Action Plan
C.BR12.5	1	Bridge	environmental investigation	borings to deeper depths should be taken during design phase to determine depth of contamination and amount	Agree; implement where needed
C.CR12.1	1	Commuter Rail	post revenue service surfacing and alignment	if trains are running on tracks, perform final surface and alignment immediately in lieu of waiting many months	Agree where applicable
C.CR12.2	1	Commuter Rail	QA/QC during construction phase	GC should witness manufacturing, storage and transport of manufactured material prior to shipment	Agree; do QC reports when material is being delivered; inspection report by onsite field staff;
C.CR12.3	1	Commuter Rail	existing utilities	more in-depth analysis and coordination effort should be performed with all existing utility companies within the vicinity of the project site	should be done in early phases of design; at PDG's have a specific focus on utilities; invite utility companies to PDG's; include this requirement in upcoming PM Manual; consider this scope during negotiations of special services

## Lessons Learned Management Response - Construction

I.D. #	Item No.	Classification	Brief Description	Recommendation	Management Brief Action Plan
C.CR12.4	1	Commuter Rail	unanticipated utilities	perform addtl sub-surface exploration during design phase and add an allowance pay item for unanticipated conditions	should be done in early phases of design; at PDG's have a specific focus on utilities; invite utility companies to PDG's; include this requirement in upcoming PM Manual; consider this scope during negotiations of special services
C.EL12.1	1	Elevator	inacurate as-built drawings	ensure accurate as-built drawings are submitted at end of contract	Agree; as-built drawing process is under revision
C.EL12.2	1	Elevator	elevator cab door interlocking system	ensure desired product and/or system is available for use	Agree; need to ensure generic elevator spec. addresses this issue
C.EL12.3	1	Elevator	inacurate boring readings due to shifting water levels	diligent time and labor should be taken in order to determine accuracy of water table	Agree; should be implemented as needed
C.EL12.4	1	Elevator	steel beam and lead tiles to be removed	because unforeseen conditions exist, addtl time and compensation should be specifically considered for unforeseen eventualities	Agree
C.EN12.1	1	Environmental	project contingency	project should have contingency for potential change orders	Agree, has been implemented

## Lessons Learned Management Response - Construction

I.D. #	Item No.	Classification	Brief Description	Recommendation	Management Brief Action Plan
C.EN12.2	1	Environmental	procurement and design process	consider having field office and other depts. involved in design and procurement process in order to avoid oversight on parts required	Agree, need to establish authority of PM
C.MF12.1	1	Maintenance Facility Improvement	control foundation excavation and soil removal cost	detail research on site soil	expand amount of boring requirements
	2			prepare suggested excavation plan	make sure to incorporate/confirm in our contracts
	3			hire licensed site representative	obtain a GEC contract (independent evaluation)
	4			provide detailed soil removal payment method	unit price revised into allowance items
C.NV12.1	1	New Vertical Construction	potential unfunded liability to T as a result of TOD	confirm that proposed TOD construction will not present new financial obligations to the T	Agree; develop a new standard TOD guideline that addresses this issue
	2			require TOD's to modify stations to be ADA and code compliant as part of their design development	Agree; develop a new standard TOD guideline that addresses this issue

## Lessons Learned Management Response - Construction

I.D. #	Item No.	Classification	Brief Description	Recommendation	Management Brief Action Plan
C.RW12.1	1	Roadway	right of entry agreement letters	All Right of Entry Agreement letters to building owners should be negotiated before NTP is issued to contractor	Agree; has been implemented on Pre-Bid Control Review Sheet
C.SI12.1	1	System Improvement	coordination of work	T should establish its own in-house labor force and equipment to repair leaks in the stations, eliminating need to hire a contractor	under further review D&C to discuss with E&M
C.SR12.1	1	Station Renovation	test pits dug during design phase	perform test pits to verify elevation of buried structures and utilities during early design	Agree; should be considered during negotiations of special services
C.SR12.2	1	Station Renovation	QA/QC during construction phase	QA/QC inspections (expansion joints) during initial material installation; change type of backer	Agree to QA inspections; will discuss spec. change with QA/QC dept.
C.SR12.3	1	Station Renovation	obstructions	create float in schedule to account for "probable" obstructions and utility issues	Agree; create time allowance and require time on the critical path; an obstruction spec needs to be created
	2			provide crew per day cost	information is provided with the cost and resource loaded schedule
	3			develop pay item within contingency budget	Agree

## Lessons Learned Management Response - Construction

I.D. #	Item No.	Classification	Brief Description	Recommendation	Management Brief Action Plan
C.SR12.4	1	Station Renovation	public space finished floor surfaces	in lieu of concrete station platform, finish should be a coating that provides non-slip surface; platform design becomes slippery when wet, creating a hazard	Agree; specs. to be reviewed by QA and design guidelines to be developed by M. Lackner
C.SR12.5	1	Station Renovation	unknown utilities cost impact	During design phase, Consultant should be tasked with reviewing all records associated with project and perform physical walk downs of site	should be done in early phases of design; at PDG's have a specific focus on utilities; invite utility companies to PDG's; include this requirement in upcoming PM Manual; consider this scope during negotiations of special services
C.SR12.6	1	Station Renovation	lack of coordination on fire alarm between designer and BFD	at early stages of a project, the designer and T project manager should submit drawings to DPS/BFD with face to face follow up coordination meeting after review.	Agree; have implemented code review at early phases and coordination at PDG's

## Lessons Learned Management Response - Construction

I.D. #	Item No.	Classification	Brief Description	Recommendation	Management Brief Action Plan
C.SR12.6	1	Station Renovation		to avoid scope creep, during the design phases ,DPS/BFD should make a site visit with designer and T Fire Alarm Service Co., this inspection could be incorporated into construction schedule with some cost loaded value	Agree; have implemented code review at early phases and coordination at PDG's



# CONSTRUCTION

**BRIDGE**

Massachusetts Bay Transportation Authority  
Design & Construction Department

**Lessons Learned Form**

QTR. 3 - 2011

- 1. Jan. - Mar.
- 2. Apr. - June

- 3. Jul - Sept**
- 4. Oct. - Dec.

1. Project Title: Neponset River Bridge Replacement Project, Fairmount Corridor Improvements,  
Boston, MA.

2. Contract #: H74CN08

3. Lessons Learned #: No. 2

4. Date: July 19, 2011

5. Project Delivery Method

Design - Bid - Build

Design Build

CM @ Risk

6. Phase:

Conceptual Design of 15%

Preliminary Design 15% - 60%

Final Design 60% - 100%

Procurement

Construction

7. Project Classification:

System Improvement

Parking Lot

Roadway

Commuter Rail

Bridge

Station Renovation

New Capital Expansion

Noise Wall

Building Demo

Maintenance Facility Improvement

New Elevator

Replacement Elevator

Parking Garage

Light Rail Right-of-Way

New Vertical Construction

Environmental

Heavy Civil

Signal/Comm./Power

8. Lessons Learned Affected Category:

Scope

Time

Cost

Management

Massachusetts Bay Transportation Authority  
Design & Construction Department

9. Is this a safety related lesson?                      Yes                      No

10. Title of Lessons Learned: Identifying damage to utilities by geotech sub-consultant during design phase

11. Background: The boring chart included in the contract drawings identified brick and mortar at depth 17' for bore hole B-1. In spite of this, the sub-consultant neither verified the presence of any buried brick or concrete pipes in the area nor informed the prime consultant about the issue. During construction, the contractor identified two manholes and a camera was sent in from manhole to manhole to observe the condition of the utility. This process identified pre-existing damage to the brick sewer at which point the owner of the utility (MWRA) was contacted and arrangements were made to fix the damage prior to moving forward with the construction activities at the south abutment area. Construction activity was then moved over to the north abutment area which prevented any adverse impact on schedule.

12. Lessons Learned Challenges (what needs improvement or what went well?): It is important to identify all buried utilities. Proper action by the project team in moving the construction activities to the north abutment side helped keep the project on schedule.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?): Follow recommendation in Item 12 to avoid the same issue for future projects.

14. Applicability: It is important to discuss this experience with consultants during design phase to avoid future issues of similar type.

Submitted by: Elizabeth Ozhathil, P.E.

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10. Title of Lessons Learned: Contech Pre-Cast Walls

11. Background: This project has 5 proposed casts in place walls that were changed to the Contech Pre-cast walls.

12. Lessons Learned Challenges (what needs improvement or what went well?): The Value Engineering proposals section of the general conditions was followed to incorporate this cost and time saving alternative.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?): It would be the recommendation that any project with retaining wall with lengths above 200 ft. should use this or a similar wall systems. To build these walls as casts in place in the same time would have required the use of multiple crews greatly increasing the cost and time for the project.

14. Applicability: Any project that retaining walls.

Submitted by: Elizabeth Ozhathil, P.E/Mike Ryan

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Email: eoathil@mbta.com

## Lessons Learned Form

QTR. 3 - 2011

1. Jan. - Mar.

3. Jul - Sept

2. Apr. - June

4. Oct. - Dec.

1. Project Title: Neponset River Bridge Replacement Project, Fairmount Corridor Improvements,  
Boston, MA.

2. Contract #: H74CN08

3. Lessons Learned #: No. 1

4. Date: July 1, 2011

5. Project Delivery Method

Design - Bld - Build

Design Build

CM @ Risk

6. Phase:

Conceptual Design of 15%

Preliminary Design 15% - 60%

Final Design 60% - 100%

Procurement

Construction

7. Project Classification:

System Improvement

Parking Lot

Roadway

Commuter Rail

Bridge

Station Renovation

New Capital Expansion

Noise Wall

Building Demo

Maintenance Facility Improvement

New Elevator

Replacement Elevator

Parking Garage

Light Rail Right-of-Way

New Vertical Construction

Environmental

Heavy Civil

Signal/Comm./Power

8. Lessons Learned Affected Category:

Scope

Time

Cost

Management

9. Is this a safety related lesson?                      Yes                      No

10. Title of Lessons Learned: Identifying access to R.O.W and construction site on the contract drawings

11. Background: The contract drawings identified a property as "easement " on the contract drawings. Both the designer and the project office intended that to be only an access to the R.O.W for the contractor. Since the word "easement" was used and we had not included the real estate documents (agreement with the owner) which clearly identified the property as an access only, the contractor assumed and was parking equipments in the area. A revised agreement had to made with the property owner which included a rent of \$15,000 for 30 months (\$500 per month).

12. Lessons Learned Challenges (what needs improvement or what went well?): It is important that the real estate deal/document with the property owners, adjacent to the project site, be included as part of the Appendix to the contract specification.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?): Follow recommendation in Item 12 to avoid the same issue for future projects.

14. Applicability: It is important to include all real estate documents in the speciifications

Submitted by: Elizabeth Ozhathil, P.E.

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### Lessons Learned Form

QTR. 20 12

1. Jan. - Mar

2. Apr. - June

3. Jul. - Sept.

4. Oct. - Dec.

1. Project Title: Talbot Avenue Commuter Rail Station and  
Talbot & Woodrow Avenue Bridge Replacements

2. Contract #: H74CN07

3. Lessons Learned #: 1

4. Date: January 12, 2012

5. Project Delivery Method

**Design - Bid - Build**

Design Build

CM @ Risk

6. Phase:

Conceptual Design of 15%

Preliminary Design 15% - 60%

Final Design 60% - 100%

Procurement

**Construction**

7. Project Classification:

System Improvement

Parking Lot

Roadway

**Commuter Rail Station**

**Bridge**

Station Renovation

New Capital Expansion

Noise Wall

Building Demo

Maintenance Facility Improvement

New Elevator

Replacement Elevator

Parking Garage

Light Rail Right-of-Way

New Vertical Construction

Environmental

Heavy Civil

Signal/Comm./Power

8. Lessons Learned Affected Category:

**Scope**

**Time**

**Cost**

**Management**

9. Is this a safety related lesson?

Yes

**No**



Massachusetts Bay Transportation Authority  
Design & Construction Department

10. Title of Lessons Learned: Rapid Bridge Construction

11. Background: The replacement of the Talbot & Woodrow Avenue Bridges utilized Self-Propelled Modular Transporters (SPMTs) as a method to transport and place the bridge structures. The bridge structures were previously assembled on temporary shoring towers adjacent to the existing bridges.

12. Lessons Learned Challenges (what needs improvement or what went well?): Using innovative methods and advanced technical equipment allowed for full bridge replacement and returning normal train service during a three-day period.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?): By constructing the bridge abutments, approach slabs, bridge aprons and other structural elements on site prior to the actual installation, allowed for the rapid bridge construction to be performed effectively and efficiently ahead of the planned schedule.

14. Applicability: Design Phase and Construction Phase

Submitted by: Mark P. Czyrkliis

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Email: mczyrkliis@mbta.com



### Lessons Learned Form

QTR. 20\_\_\_\_

1. Jan. - Mar.

3. Jul. - Sept.

2. Apr. - June

x4. Oct. - Dec.

1. Project Title: Reconstruction of Fairmount Line Bridge:

2. Contract #: B74CN01

3. Lessons Learned #: 1

4. Date: 1-4-12

5. Project Delivery Method

Design - Bid - Build

Design Build

CM @ Risk

6. Phase:

Conceptual Design of 15%

Preliminary Design 15% - 60%

Final Design 60% - 100%

Procurement

Construction

7. Project Classification:

System Improvement

Parking Lot

Roadway

Commuter Rail

Bridge

Station Renovation

New Capital Expansion

Noise Wall

Building Demo

Maintenance Facility Improvement

New Elevator

Replacement Elevator

Parking Garage

Light Rail Right-of-Way

New Vertical Construction

Environmental

Heavy Civil

Signal/Comm./Power

8. Lessons Learned Affected Category:

Scope

Time

Cost

Management

9. Is this a safety related lesson?

Yes

No



Massachusetts Bay Transportation Authority  
Design & Construction Department

10. **Title of Lessons Learned:** Environmental investigation to chasing of soils to be removed

11. **Background:**

During the soil removal of Yard # 5 cleanup: testing determined that soil under the piles and designated areas depth to be removed did not clean out all the contaminated material which resulted in chasing of additional commentated soil l to be removed. This has resulted in a cost overrun to the contract

12. **Lessons Learned Challenges :**

Environmental removal of contaminated soil need to be fully investigated during the design phase, by the Design Engineer, to avoided contractual cost over run to issued contract.

13. **Lessons Learned Recommendations:**

Borings to deeper depths should be taken during design phase to determine the depth of contamination and more exact amounts to be removed .

14. **Applicability:**

Change Order cost overrun to the contract can be avoided with further testing and investigation during the design phase by the design Engineer.

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# COMMUTER RAIL

### Lessons Learned Form

QTR. 20\_\_\_\_

- |   |  |
|---|--|
| <input type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept.           |
| <input type="checkbox"/> 2. Apr. - June | <input checked="" type="checkbox"/> 4. Oct. - Dec. |

1. Project Title: OCRR Tie Replacement

2. Contract #: G80CN01

3. Lessons Learned #: 1

4. Date: October 2011

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |   |   |
|---|---|
| <input type="checkbox"/> System Improvement       | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot              | <input type="checkbox"/> New Elevator                     |
| <input type="checkbox"/> Roadway                  | <input type="checkbox"/> Replacement Elevator             |
| <input checked="" type="checkbox"/> Commuter Rail | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                   | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input type="checkbox"/> Station Renovation       | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion    | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall               | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo            | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |                                |  |
|--------------------------------|--|
| <input type="checkbox"/> Scope | <input checked="" type="checkbox"/> Time |
| <input type="checkbox"/> Cost  | <input type="checkbox"/> Management      |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Post-Revenue Service

11. Background:

Our Contract Specification call for 'Post Revenue Service surfacing and alignment" after six week of Substantial Completion.  
The surfacing and alignment were done right after the tie replacement since there was always train traffic on the track..

12. Lessons Learned Challenges (what needs improvement or what went well?):

We were able to finish the project 6 month ahead schedule

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

If we are replacing ties, there is no need to wait certain amount of month for the final surfacing and alignment, as long as there are trains running on the tracks.

14. Applicability:

Submitted by: Maribel Kelly

Telephone #: 617-699-6721 Email: mskelly@mbta.com





**Massachusetts Bay Transportation Authority**  
**Design & Construction Department**

### Lessons Learned Form

QTR. 20 12

1. Jan. - Mar.  
2. Apr. - June

3. Jul. - Sept.  
4. Oct. - Dec.

1. Project Title: Four Corners Commuter Rail Station

2. Contract #: H74CN05

3. Lessons Learned #: 1

4. Date: January 6, 2012

5. Project Delivery Method

**Design - Bid - Build**

Design Build

CM @ Risk

6. Phase:

Conceptual Design of 15%

Preliminary Design 15% - 60%

Final Design 60% - 100%

Procurement

**Construction**

7. Project Classification:

System Improvement

Parking Lot

Roadway

**Commuter Rail Station**

Bridge

Station Renovation

New Capital Expansion

Noise Wall

Building Demo

Maintenance Facility Improvement

New Elevator

Replacement Elevator

Parking Garage

Light Rail Right-of-Way

New Vertical Construction

Environmental

Heavy Civil

Signal/Comm./Power

8. Lessons Learned Affected Category:

Scope

Time

**Quality**

Cost

Management

9. Is this a safety related lesson?

Yes

**No**



Massachusetts Bay Transportation Authority  
Design & Construction Department

10. Title of Lessons Learned: Concrete Precast Platform Panel Cracks

11. Background: Upon installation of the inbound precast platform panels, MBTA Field Staff discovered quality anomalies of the units.

12. Lessons Learned Challenges (what needs improvement or what went well?): QA/QC inspections of the off-site manufacturing of materials should be better controlled by the manufacturer and the inspection and acceptance of the materials should be better controlled by the General Contractor prior to shipment on site and installation.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?): I would recommend that the General Contractor witness the manufacturing, storage and transport of the manufactured materials prior to shipment. This would allow for off-site acceptance or rejection of materials prior to shipment and installation to improve quality.

14. Applicability: QA/QC during Construction Phase

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Email: mczykrlis@mbta.com



### Lessons Learned Form

QTR. 20 12

1. Jan. - Mar.  
2. Apr. - June

3. Jul. - Sept.  
4. Oct. - Dec.

1. Project Title: Newmarket Commuter Rail Station

2. Contract #: H74CN06

3. Lessons Learned #: 1

4. Date: January 12, 2012

5. Project Delivery Method

**Design - Bid - Build**

Design Build

CM @ Risk

6. Phase:

Conceptual Design of 15%

Preliminary Design 15% - 60%

Final Design 60% - 100%

Procurement

**Construction**

7. Project Classification:

System Improvement

Parking Lot

Roadway

**Commuter Rail Station**

Bridge

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Light Rail Right-of-Way

New Vertical Construction

Environmental

Heavy Civil

Signal/Comm./Power

8. Lessons Learned Affected Category:

Scope

**Time**

Cost

**Management**

9. Is this a safety related lesson?

Yes

**No**



Massachusetts Bay Transportation Authority  
Design & Construction Department

10. Title of Lessons Learned: Existing Utilities

11. Background: During the excavation for the inbound sloped walkway retaining walls, an existing concrete encased duct bank was discovered that was not identified on the contract drawings.

12. Lessons Learned Challenges (what needs improvement or what went well?): Investigations by the Design Consultant, General Contractor and MBTA Staff resulted in the discovery that the duct bank was for power distribution from NStar to the South Bay Shopping Center. Fortunately, this issue did not result in additional costs to the Authority.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?): A more in-depth analysis and coordination efforts should be performed with all existing utility companies within the vicinity of the project site so that “unforeseen conditions” do not arise.

14. Applicability: Design Phase and Construction Phase.

Submitted by: Mark P. Czyrkliis

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Email: mczyrkliis@mbta.com

### Lessons Learned Form

QTR. 20 11

- |   |  |
|---|--|
| <input type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept.           |
| <input type="checkbox"/> 2. Apr. - June | <input checked="" type="checkbox"/> 4. Oct. - Dec. |

1. Project Title: Wedgemere Station Accessibility Improvements

2. Contract #: D36CN01

3. Lessons Learned #: 1

4. Date: 1/23/2012

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |   |   |
|---|---|
| <input type="checkbox"/> System Improvement       | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot              | <input type="checkbox"/> New Elevator                     |
| <input type="checkbox"/> Roadway                  | <input type="checkbox"/> Replacement Elevator             |
| <input checked="" type="checkbox"/> Commuter Rail | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                   | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input type="checkbox"/> Station Renovation       | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion    | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall               | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo            | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Scope | <input checked="" type="checkbox"/> Time |
| <input checked="" type="checkbox"/> Cost  | <input type="checkbox"/> Management      |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Unanticipated utilities

11. Background:

Excavation performed during construction revealed the presence of utility lines and other unknown pipes that had not been previously identified. These underground utilities were in conflict with the locations of the proposed drilled shafts for the new mini-high platforms.

12. Lessons Learned Challenges (what needs improvement or what went well?):

A program of sub-surface exploration performed during the design phase should be utilized to verify information provided by utility companies.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

Perform additional sub-surface exploration during the design phase and add an allowance pay item for unanticipated conditions.

14. Applicability:

This lessons learned is applicable to all projects in which foundations or underground utilities are to be installed.

Submitted by: Jeffrey Sarin

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Email: jsarin@mbta.com

# ELEVATOR



### Lessons Learned Form

QTR. 20\_\_

- |   |  |
|---|--|
| <input type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept. |
| <input type="checkbox"/> 2. Apr. - June | <input type="checkbox"/> 4. Oct. - Dec.  |

1. Project Title: Porter SA Vert. Transportation Improvements

2. Contract #: A40CNOY

3. Lessons Learned #: 1

4. Date: 1/9/12

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement    | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot           | <input checked="" type="checkbox"/> New Elevator          |
| <input type="checkbox"/> Roadway               | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail         | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input type="checkbox"/> Station Renovation    | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall            | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo         | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |  |                                     |
|--|-------------------------------------|
| <input type="checkbox"/> Scope           | <input type="checkbox"/> Time       |
| <input checked="" type="checkbox"/> Cost | <input type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: As-Built,

11. Background:

As-Built drawings have not depicted FA conduits crossing the Fan Room slab @ proposed location of Elk # 4 Piston. Conduits were severed during coring of the slab damaging Zone 7 and 8 which service the mezzanine and the red line north bound platform.

12. Lessons Learned Challenges (what needs improvement or what went well?):

- Immediate system repairs
- Lack of information
- Additional cost.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

Ensure accurate as-built dwgs are submitted @ end of Contract.

14. Applicability:

As-built dwgs and Existing field conditions to be well known by Design Engineer.

Submitted by: Girard Allu

Telephone #: 617. 328. 2197 Email: gallian@mbta.com

### Lessons Learned Form

QTR. 20\_\_

- |   |  |
|---|--|
| <input type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept. |
| <input type="checkbox"/> 2. Apr. - June | <input type="checkbox"/> 4. Oct. - Dec.  |

1. Project Title: HARVARD SQ. VERT. TRANSP. IMPROVEMENTS

2. Contract #: A40CNO1

3. Lessons Learned #: 1

4. Date: 1/9/12

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement    | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot           | <input checked="" type="checkbox"/> New Elevator          |
| <input type="checkbox"/> Roadway               | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail         | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input type="checkbox"/> Station Renovation    | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall            | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo         | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |  |  |
|--|--|
| <input type="checkbox"/> Scope           | <input checked="" type="checkbox"/> Time |
| <input checked="" type="checkbox"/> Cost | <input type="checkbox"/> Management      |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Elevator Cab Door Interlocking System

11. Background:

During Design the Authority was informed that the system is available. The gap between the elevator cab door and the <sup>edge of the</sup> shaft which could potentially be a safety issue in the event the door accidentally opens up was not a concern. The project had to apply for a variance from the elevator board for a fascia as soon as it found out that the cab door interlocking system did not exist.

12. Lessons Learned Challenges (what needs improvement or what went well?):

- Redesign
- milestone
- Additional cost

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

Ensure desired product and/or system is available for use

14. Applicability:

steel / Glass Fascia to be installed in all new elevators.

Submitted by: Girard Allie

Telephone #: 617.829.2197

Email: gallie@MBTA.com

### Lessons Learned Form

QTR. 20\_\_

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept. |
| <input type="checkbox"/> 2. Apr. - June            | <input type="checkbox"/> 4. Oct. - Dec.  |

1. Project Title: State Street Station, Vertical Transportation Improvement

2. Contract #: A40CN02

3. Lessons Learned #: 1

4. Date: January 9, 2012

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement    | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot           | <input checked="" type="checkbox"/> New Elevator          |
| <input type="checkbox"/> Roadway               | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail         | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input type="checkbox"/> Station Renovation    | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall            | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo         | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |   |                                     |
|---|-------------------------------------|
| <input checked="" type="checkbox"/> Scope | <input type="checkbox"/> Time       |
| <input type="checkbox"/> Cost             | <input type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Inaccurate boring readings due to shifting water levels

11. Background:

Prior to the State Street Elevator Project beginning, borings were performed to determine what possible obstacles may be encountered during the course of construction, i.e. rock, water, etc. The results would help determine the amount of time and labor required in regards to digging and installing the new elevator.

Initial results showed that the water table was lower than it actually was and that it would not obstruct the digging aspect of construction. However, in the mid to late 1800's, the City of Boston underwent land reclamation and expanded through landfill and annexation. As a result it caused extra challenges acquiring accurate water level readings.



12. Lessons Learned Challenges (what needs improvement or what went well?):

In order to improve future construction projects such as this, a more extensive look into the history of the condition of the land and its uses etc., will reveal a better idea of what obstacles may be encountered during the course of actual construction.

Although extra exploratory work done in the initial design phase will add more time and costs to the project, it will potentially save large costs in the end.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

Because of the condition of the land and variables including large construction projects close by the area, underground water levels can potentially move and or shift. Also, amounts of rainfall can make a boring test inaccurate and can show the area clear which may prove inconsistent with the initial test. Additional time and labor done in diligence will determine more accurately where the water table exists which is imperative to evaluate design costs, time, and labor requirements.

14. Applicability:

In order to apply the knowledge gained from the above issue, closer attention needs to be given to both simple and complicated aspects of the design phase. Communication between the Project Team and the Design Engineer should be extensive regarding such issues during the preliminary design.

Submitted by: Enrique Espinoza

Telephone #: (617) 227-0037 Email: eespinoza@mbta.com

### Lessons Learned Form

QTR. 20 12

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept. |
| <input type="checkbox"/> 2. Apr. - June            | <input type="checkbox"/> 4. Oct. - Dec.  |

1. Project Title: Park Street Station, Vertical Transportation Improvement

2. Contract #: A40CN03

3. Lessons Learned #: 1

4. Date: January 9, 2012

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement    | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot           | <input checked="" type="checkbox"/> New Elevator          |
| <input type="checkbox"/> Roadway               | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail         | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input type="checkbox"/> Station Renovation    | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall            | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo         | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |   |                                     |
|---|-------------------------------------|
| <input checked="" type="checkbox"/> Scope | <input type="checkbox"/> Time       |
| <input type="checkbox"/> Cost             | <input type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Steel Beam and Lead Tiles Removed from Stair #2

11. Background:

Contaminated lead tiles and a steel beam discovered during the course of construction at Stairway #2 which were not shown on the original contract drawings. It was necessary to remove the lead tiles and beam prior to proceeding with the demolition and removal of the existing stairs also to provide a safe work environment for the contractor and the commuting public.

**12. Lessons Learned Challenges (what needs improvement or what went well?):**

Lead tile was discovered on the Green Line Platform (west bound) near Stairway No. 2 and descending down to the Red Line's Center Platform. Also, a steel beam which was not shown on the as-built drawings was discovered while demoing for the new elevator.

Working on an underground subway system one hundred and fifteen years old can and will increase the potential to unearth and reveal unexpected field conditions. Without accurate as-built drawings, it is nearly impossible to predict where and when obstacles such as these can, and most likely will be encountered.

**13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):**

Because some unforeseen conditions exist, additional time and compensation should be specifically considered for any unforeseen eventualities.

Because of the relationship between the MBTA's Project team and the field office, the solutions to the two unforeseen conditions were negotiated with the contractor to the best possible cost.

**14. Applicability:**

In order to apply the knowledge gained from such issues, closer communication and scrutiny between the Project Team and the Design Engineer during the preliminary design phase should be given where the above potentialities exist.

Submitted by: Enrique Espinoza

Telephone #: (617) 227-0037 Email: eespinoza@mbta.com

**ENVIRONMENTAL**

## Lessons Learned Form

QTR. 20 11

- |   |  |
|---|--|
| <input type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept.           |
| <input type="checkbox"/> 2. Apr. - June | <input checked="" type="checkbox"/> 4. Oct. - Dec. |

1. Project Title: 100 Killowatt Wind Turbine Installation Project Kingston Layover Facility

2. Contract #: D28CN01

3. Lessons Learned #: \_\_\_\_\_

4. Date: \_\_\_\_\_

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement    | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot           | <input type="checkbox"/> New Elevator                     |
| <input type="checkbox"/> Roadway               | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail         | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input type="checkbox"/> Station Renovation    | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion | <input checked="" type="checkbox"/> Environmental         |
| <input type="checkbox"/> Noise Wall            | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo         | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |   |                                     |
|---|-------------------------------------|
| <input checked="" type="checkbox"/> Scope | <input type="checkbox"/> Time       |
| <input checked="" type="checkbox"/> Cost  | <input type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Transformer for Wind Turbine

11. Background:

Our specifications estate that Transformer would be provided by the Authority. We had no provision to purchase it.

12. Lessons Learned Challenges (what needs improvement or what went well?):

We handle the provision through a CO but come to find out we do not have money for any construction contingency.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

Every Construction Contract should have money for Construction Contingencies.

14. Applicability:

Submitted by: Maribel Kelly

Telephone #: 617-699-6721 Email: mskelly@mbta.com



## Lessons Learned Form

QTR. 20\_\_\_\_

- |   |  |
|---|--|
| <input type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept.           |
| <input type="checkbox"/> 2. Apr. - June | <input checked="" type="checkbox"/> 4. Oct. - Dec. |

1. Project Title: 100 Kilowatt Wind Turbine Installation Project Kingston Layover Facility

2. Contract #: D28CN01

3. Lessons Learned #: 1

4. Date: November, 2011

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement    | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot           | <input type="checkbox"/> New Elevator                     |
| <input type="checkbox"/> Roadway               | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail         | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input type="checkbox"/> Station Renovation    | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion | <input checked="" type="checkbox"/> Environmental         |
| <input type="checkbox"/> Noise Wall            | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo         | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |   |                                     |
|---|-------------------------------------|
| <input checked="" type="checkbox"/> Scope | <input type="checkbox"/> Time       |
| <input checked="" type="checkbox"/> Cost  | <input type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Template Ring and Foundation Bolts design and bolts procurement for the turbine tower

11. Background:

The bolts where not included in or constructions contract  
Our drawings and specifications (see adendum 3) refers to the Manufacturer as the provider.  
The procurement contract for Manufacturer, does not includes the bolts, it actually states clearly that all foundation and foundations parts are part of separate contract.

12. Lessons Learned Challenges (what needs improvement or what went well?):

Find out parties involved in a project that includes different departments. In this case Environmental, Purchasing department, Design and Construction and MBCR. It was challenging to get a copy of the procurement contract.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

we have full knowledge all of the parts involved in the erection and commissioning.

14. Applicability:

Since this is not the first Wind turbine that will be install in our System. Field office should be involved in the previous process of procurement and design.

Submitted by: Maribel Kelly

Telephone #: 617-699-3721 Email: mskelly@mbta.com

**MAINTENANCE  
FACILITY  
IMPROVEMENT**



7. Project Classification:

- |  |  |
|--|--|
| <input type="checkbox"/> System Improvement    | <input checked="" type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot           | <input type="checkbox"/> New Elevator                                |
| <input type="checkbox"/> Roadway               | <input type="checkbox"/> Replacement Elevator                        |
| <input type="checkbox"/> Commuter Rail         | <input type="checkbox"/> Parking Garage                              |
| <input type="checkbox"/> Bridge                | <input type="checkbox"/> Light Rail Right-of-Way                     |
| <input type="checkbox"/> Station Renovation    | <input type="checkbox"/> New Vertical Construction                   |
| <input type="checkbox"/> New Capital Expansion | <input type="checkbox"/> Environmental                               |
| <input type="checkbox"/> Noise Wall            | <input type="checkbox"/> Heavy Civil                                 |
| <input type="checkbox"/> Building Demo         | <input type="checkbox"/> Signal/Comm./Power                          |

8. Lessons Learned Affected Category:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Scope | <input checked="" type="checkbox"/> Time       |
| <input checked="" type="checkbox"/> Cost  | <input checked="" type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Control foundation excavation and soil removal cost

11. Background:

For many contracts, there has been cost over runs due to change orders for foundation excavation and soil removal off site costs. This also is the area for a contractor's penny bids to heavily front load the contract cash flow.

12. Lessons Learned Challenges (what needs improvement or what went well?):

Improvement needed - Soil removal change order cost appears high and can be reduced.

Areas well done - substantially completed contracts within the authorized budget and schedule

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

Perform a detailed research on the site soil, environmental and geological condition and make the information as a part of the bid package; Prepare a suggested excavation plan for the constructability and an excavation cost basis. In lieu of a contractor, MBTA should hire a licensed site representative to determine the level of soil to be used and removed off site. Provide more detailed soil removal payment method ( by weight, by volume, dry or wet conditions, etc)

14. Applicability:

Various design and construction contracts

Submitted by: Wei-Lee Shia

Telephone #: x6123 Email: wshia@mbta.com

# NEW VERTICAL CONSTRUCTION



### Lessons Learned Form

QTR. 20 11

- |   |  |
|---|--|
| <input type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept.           |
| <input type="checkbox"/> 2. Apr. - June | <input checked="" type="checkbox"/> 4. Oct. - Dec. |

1. Project Title: Parcel 13 TOD, Hynes Convention Center Station

2. Contract #: None

3. Lessons Learned #: 1

4. Date: 1/10/2012

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement            | <input type="checkbox"/> Maintenance Facility Improvement           |
| <input type="checkbox"/> Parking Lot                   | <input type="checkbox"/> New Elevator                               |
| <input type="checkbox"/> Roadway                       | <input type="checkbox"/> Replacement Elevator                       |
| <input type="checkbox"/> Commuter Rail                 | <input type="checkbox"/> Parking Garage                             |
| <input type="checkbox"/> Bridge                        | <input type="checkbox"/> Light Rail Right-of-Way                    |
| <input checked="" type="checkbox"/> Station Renovation | <input checked="" type="checkbox"/> New Vertical Construction / 700 |
| <input type="checkbox"/> New Capital Expansion         | <input type="checkbox"/> Environmental                              |
| <input type="checkbox"/> Noise Wall                    | <input type="checkbox"/> Heavy Civil                                |
| <input type="checkbox"/> Building Demo                 | <input type="checkbox"/> Signal/Comm./Power                         |

8. Lessons Learned Affected Category:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Scope | <input checked="" type="checkbox"/> Time       |
| <input checked="" type="checkbox"/> Cost  | <input checked="" type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

Unfunded Liability for the MBTA due to the Parcel 13 TOD at Hynes Station

10. Title of Lessons Learned: \_\_\_\_\_

11. Background:

The proposed Parcel 13 TOD will overbuild the MBTA's Boylston Street head house at Hynes Station and provide a new Station entrance through the development at the Boylston Street level. Then, the development would provide elevators to navigate the elevation difference between Boylston Street and the floor level at the head house.

Although the development will have public benefit, once the development is completed the MBTA will be required to make the Station fully ADA compliant in accordance with the Massachusetts Architectural Access Board and meet prevailing Building Code requirements for the Station due to the renovations.

The MBTA has funded conceptual design (15%) services to make the Hynes Station accessible. The investigation of possible elevator locations will be used to assess the probability and to determine estimated construction and acquisition costs. There is currently no funding beyond this 15% design level.

12. Lessons Learned Challenges (what needs improvement or what went well?):

The MBTA notified MASSDOT Real Estate in a letter dated June 27, 2011 of the impending liability introduced by the Parcel 13 TOD.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

MBTA and MASSDOT Real Estate have an understanding of the liability introduced to the MBTA due to the TOD, the funding shortfall that prevents the MBTA from making accessibility improvements concurrent with the development and the real estate transaction considerations for the TOD parcels around the Hynes Convention Center Station.

14. Applicability:

All TOD developments.

Submitted by: Marjorie B. Madden

Telephone #: 617 222- 3797 Email: mmadden@mbta.com

**ROADWAY**

## Lessons Learned Form

QTR. 20 12

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept. |
| <input type="checkbox"/> 2. Apr. - June            | <input type="checkbox"/> 4. Oct. - Dec.  |

1. Project Title: Silver Line Essex St. Improvements

2. Contract #: S50CN01

3. Lessons Learned #: 1

4. Date: 1/11/12

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement    | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot           | <input type="checkbox"/> New Elevator                     |
| <input checked="" type="checkbox"/> Roadway    | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail         | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input type="checkbox"/> Station Renovation    | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall            | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo         | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |                                |  |
|--------------------------------|--|
| <input type="checkbox"/> Scope | <input checked="" type="checkbox"/> Time |
| <input type="checkbox"/> Cost  | <input type="checkbox"/> Management      |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Right of Entry Agreement Letters

11. Background:

This work consists of entering basements of building to construct areaways for sidewalks along the Essex St. corridor in order to operate a Bus Only Lane to South Station. Signed Right of Entry Letters by the building owners were required before any construction in basements could commence.

12. Lessons Learned Challenges (what needs improvement or what went well?):

Delays to the project were caused by the Right of Entry Agreement letters not signed by building owners to access their basements to perform construction.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

All Right of Entry Agreement letters to building owners should have been negotiated before the NTP was issued to contractor. With this in place, time delays for entry and construction would have been saved for the completion of project.

14. Applicability:

All MBTA work that involves entry of private property to perform construction.

Submitted by: Ken Lim

Telephone #: 617-222-4487 Email: KLim@mbta.com

**SYSTEM  
IMPROVEMENTS  
(OPS. PROJECT)**



### Lessons Learned Form

QTR. 20 12

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept. |
| <input type="checkbox"/> 2. Apr. - June            | <input type="checkbox"/> 4. Oct. - Dec.  |

1. Project Title: Red Line Tunnel Leak Repairs

2. Contract #: Y44CN01

3. Lessons Learned #: 1

4. Date: 1/11/12

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> System Improvement | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot                   | <input type="checkbox"/> New Elevator                     |
| <input type="checkbox"/> Roadway                       | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail                 | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                        | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input type="checkbox"/> Station Renovation            | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion         | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall                    | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo                 | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |                                |  |
|--------------------------------|--|
| <input type="checkbox"/> Scope | <input type="checkbox"/> Time                  |
| <input type="checkbox"/> Cost  | <input checked="" type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Coordination of Work

11. Background:

Work under this contract consists of repairing leaks in the Red Line Tunnel. Coordination of multiple MBTA departments is required for bus diversion from Alewife to Harvard Station.

12. Lessons Learned Challenges (what needs improvement or what went well?):

Coordination and communication of work schedule and progress meeting on a weekly basis with the various departments has worked well in ensuring minimal issues to the project.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

The MBTA should consider establishing their own in-house labor force and equipment to repair leaks in the stations and tunnels system-wide. This could save the MBTA money by eliminating processing Change Orders to have a contractor perform this work.

14. Applicability:

This work could be utilized on MBTA tunnels and stations system-wide.

Submitted by: Ken Lim

Telephone #: 617-222-4487 Email: KLim@mbta.com

**STATION  
RENOVATION  
(RAPID TRANSIT)**



**Massachusetts Bay Transportation Authority**  
**Design & Construction Department**

**Lessons Learned Form**

QTR. 20 12

- Jan. - Mar.
- 2. Apr. - June
- 3. Jul. - Sept.
- 4. Oct. - Dec.

1. **Project Title:** Science Park/West End Station

2. **Contract #:** A29CN04

3. **Lessons Learned #:** 01

4. **Date:** 1/13/2012

5. **Project Delivery Method**

- Design - Bid - Build**
- Design Build
- CM @ Risk

6. **Phase:**

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement

**Construction**

7. **Project Classification:**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>System Improvement</li> <li>Parking Lot</li> <li>Roadway</li> <li>Commuter Rail</li> <li>Bridge</li> <li><input checked="" type="checkbox"/> <b>Station Renovation</b></li> <li>New Capital Expansion</li> <li>Noise Wall</li> <li>Building Demo</li> </ul> | <ul style="list-style-type: none"> <li>Maintenance Facility Improvement</li> <li>New Elevator</li> <li>Replacement Elevator</li> <li>Parking Garage</li> <li>Light Rail Right-of-Way</li> <li>New Vertical Construction</li> <li>Environmental</li> <li>Heavy Civil</li> <li>Signal/Comm./Power</li> </ul> |
|--|--|

8. **Lessons Learned Affected Category:**

- |  |   |   |
|--|---|---|
| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> <b>Scope</b></li> <li>Cost</li> </ul> | <ul style="list-style-type: none"> <li>Time Management</li> </ul> | <ul style="list-style-type: none"> <li>Quality Resources</li> </ul> |
|--|---|---|

9. **Is this a safety related lesson?**      Yes      No

10. **Title of Lessons Learned:** Test Pits Dug During Design Phase



Massachusetts Bay Transportation Authority  
Design & Construction Department

- 11. Background:** The Storrow Drive Westbound Tunnel (Charles Street Underpass Tunnel) constructed in the 1950's underneath Leverett Circle for vehicular traffic was directly adjacent to the new south side elevator hoist way. Three minipiles were to be driven right next to this underground structure. The tunnel roof was known to only be approximately three feet from grade level. When the minipiles were laid out it was found that the two of the mini-piles were in conflict with the tunnel structure.
- 12. Lessons Learned Challenges (what needs improvement or what went well?):** Since the new structure of the elevator hoist way foundation was designed to be constructed directly adjacent to the existing tunnel structure, and the tunnel structure was known to be relatively shallow in an area that was only covered by soil (not underneath a street), the designer could have hired a contractor to test pit the tunnel in this area to find out exactly where its edge was.
- 13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):** Since our new structure was to be built right next to an existing underground structure I would task the designer during the design phase to determine the exact location of the underground tunnel by test-pitting and surveying the coordinates of the underground structures edge. The contractor could be tasked with this but it takes up considerable resources and time to deal with a foundation redesign during the construction phase. Also, it was critical to try to know where the underground tunnel edge was since we were building our elevator structure directly adjacent to it.
- 14. Applicability:** Construction projects in design that have new structures being built directly next to large underground structures that are relatively close to the surface. The location of these underground structures should be verified during the design phase via the design consultant hiring a contractor to perform a test pit.

Submitted by: John McCormack

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**Massachusetts Bay Transportation Authority**  
**Design & Construction Department**

**Lessons Learned Form**

QTR. 20 12

**1. Jan. - Mar.**  
**2. Apr. - June**

**3. Jul. - Sept.**  
**4. Oct. - Dec.**

1. Project Title: North Quincy Station Platform Repair

2. Contract #: S46CN01

3. Lessons Learned #: 1

4. Date: January 12, 2012

5. Project Delivery Method

**Design - Bid - Build**

- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement

**Construction**

7. Project Classification:

- |  |                                  |
|--|----------------------------------|
| System Improvement                                     | Maintenance Facility Improvement |
| Parking Lot  | New Elevator                     |
| Roadway  | Replacement Elevator             |
| Commuter Rail Station                                  | Parking Garage                   |
| Bridge   | Light Rail Right-of-Way          |
| <input checked="" type="checkbox"/> Station Renovation | New Vertical Construction        |
| New Capital Expansion                                  | Environmental                    |
| Noise Wall   | Heavy Civil                      |
| Building Demo  | Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |       |            |  |
|-------|------------|--|
| Scope | Time       | <input checked="" type="checkbox"/> <b>Quality</b> |
| Cost  | Management |  |

9. Is this a safety related lesson?                      Yes                       **No**



Massachusetts Bay Transportation Authority  
Design & Construction Department

10. Title of Lessons Learned: Failed Expansion Joint Caulking in 1" Joints on Platform

11. Background: In July 2011, approximately nine months after the October 2010 installation of 132 LF of approximate 1" wide concrete expansion joints in the station platform, MBTA Field Staff discovered that the expansion joints had failed in multiple locations. Specifically, the Sika 2CNS caulk sealant had pulled away from the edges of the expansion joints in locations where residual MMA was visible on the sides of the joints. Since this deficiency was identified within the installer's warranty period, all 132 LF of expansion joints were re-installed at no additional cost to the MBTA on October 25, 2011.

12. Lessons Learned Challenges (what needs improvement or what went well?): QA/QC inspections during the initial material installation could have been better controlled by the waterproofing Subcontractor. In addition, inspection of the expansion joints prior to the installation of the backer rod and caulk sealant and also final acceptance should have been better controlled by the General Contractor and the MBTA Field Staff during the initial installation process.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?): The General Contractor and the MBTA Field need to witness and inspect the installation process to ensure that the subcontractor takes the necessary steps and follows QA/QC protocols. During the repair process, the edges of all of the expansion joints were first ground full-depth to remove all residual MMA and each joint was then thoroughly cleaned of all dirt, dust and debris. In lieu of the round foam backer rod used during the initial installation, pre-formed square joint filler was cut to size and installed in each joint during the repair. Finally, a layer of bond breaker tape was installed between two approximate 1/2" thick layers of the Sika 2CNS caulk sealant as an additional measure.

14. Applicability: QA/QC during Construction Phase

Submitted by: Kim Dobosz

Telephone #: 617-222-4332

Email: kdobosz@mbta.com



## Lessons Learned Form

QTR. 20\_\_

- |   |  |
|---|--|
| <input type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept. |
| <input type="checkbox"/> 2. Apr. - June | <input type="checkbox"/> 4. Oct. - Dec.  |

1. Project Title: Several Project ; Silverline, South Station, Ashmont Station, Savin Hill

2. Contract #: \_\_\_\_\_

3. Lessons Learned #: Field Obstruction

4. Date: 20 Years

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement            | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot                   | <input type="checkbox"/> New Elevator                     |
| <input type="checkbox"/> Roadway                       | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail                 | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                        | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input checked="" type="checkbox"/> Station Renovation | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion         | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall                    | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo                 | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |  |  |
|--|--|
| <input type="checkbox"/> Scope           | <input checked="" type="checkbox"/> Time       |
| <input checked="" type="checkbox"/> Cost | <input checked="" type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Field Construction

11. Background:

On every project I have managed for the MBTA there has been field obstruction during the excavation and foundation phases of construction. The MBTA continues to classify these obstructions as "unforeseen or unexpected field conditions". Many of these projects fall behind schedule in the early phases of construction due to obstructions, undocumented utilities and hazardous materials.

12. Lessons Learned Challenges (what needs improvement or what went well?):

All projects should expect the unexpected due to project history. Identify clearly in the contract language what is expected with borings and investigation. All other deemed obstructions. The project needs the ability to move forward in field to avoid huge cost and delays.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

Create float in the schedule to account for "probable" obstructions and utility issues.  
Contractor to provide crew/ day cost for foundation crews and utility crews  
Develop pay items within contingency budget which will be utilized during these phases

14. Applicability:

All project on MBTA Property

Submitted by: Scott Kelley

Telephone #: \_\_\_\_\_ Email: skelley@mbta.com

### Lessons Learned Form

QTR. 20 11

- |   |  |
|---|--|
| <input type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept.           |
| <input type="checkbox"/> 2. Apr. - June | <input checked="" type="checkbox"/> 4. Oct. - Dec. |

1. Project Title: Maverick Station

2. Contract #: S10CN04

3. Lessons Learned #: 1

4. Date: January 5, 2012

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement            | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot                   | <input checked="" type="checkbox"/> New Elevator          |
| <input type="checkbox"/> Roadway                       | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail                 | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                        | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input checked="" type="checkbox"/> Station Renovation | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion         | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall                    | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo                 | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |   |                                     |
|---|-------------------------------------|
| <input checked="" type="checkbox"/> Scope | <input type="checkbox"/> Time       |
| <input checked="" type="checkbox"/> Cost  | <input type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Public space finished floor surfaces.

11. Background:

At Maverick Station the finished floor surface was to be a smooth trowelled concrete finish. The concrete finish has a problem when condensation forms or it gets wet that it becomes slippery and a slipping/fall hazard.

12. Lessons Learned Challenges (what needs improvement or what went well?):

Station concrete floors need to be finished with a coating to provide a non-slip surface. One of the biggest problems is finding a material that is cost efficient and can easily be maintained and repaired.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

Station platform finished flooring should be a material that provides a durable non-slip finished surface. The Vikon material is performing well but time will tell if it is the best material for this application.

14. Applicability:

All platform and other public floor surfaces in construction contracts.

Submitted by: George M. Doherty Jr.

Telephone #: 3081 Email: gdoherty@mbta.com

## Lessons Learned Form

QTR. 20\_\_\_\_

1. Jan. - Mar.

3. Jul. - Sept.

2. Apr. - June

4. Oct. - Dec.

1. Project Title: Copley Station

2. Contract #: A20CN03

3. Lessons Learned #: 1

4. Date: 2/13/12

5. Project Delivery Method

**Design - Bid – Build X**

Design Build

CM @ Risk

6. Phase:

Conceptual Design of 15%

Preliminary Design 15% - 60%

Final Design 60% - 100%

Procurement

**Construction X**

7. Project Classification:

**System Improvement**

Parking Lot

Roadway

Commuter Rail

Bridge

**Station Renovation X**

New Capital Expansion

Noise Wall

Building Demo

Maintenance Facility Improvement

New Elevator

Replacement Elevator

Parking Garage

Light Rail Right-of-Way

New Vertical Construction

Environmental

Heavy Civil

Signal/Comm./Power

8. Lessons Learned Affected Category:

Scope

Time

**Cost X**

Management

9. Is this a safety related lesson?

Yes

**No X**

10. Title of Lessons Learned: More through site investigation

11. Background: During the design phase of the Copley station IB elevator, there were significant “unknowns” related to BWSC 30” sewer. As a result of the lack of sufficient information on the location and support of the line, the contractor filed a significant CO for changed SOE design as well as modifications to the permanent elevator foundation design.



12. Lessons Learned Challenges (what needs improvement or what went well?):

The design phase of any contract must perform due diligence on the existing conditions of the job to best insure the reduction of construction changes / claims.

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

During design phase, the consultant should be tasked with reviewing all records associated with job, and perform physical walk downs of all aspects of the site.

14. Applicability:

All design / construction contracts

Submitted by: Dan Beaulieu

Telephone #: 617 590 3562 Email: dbeaulieu@mbta.com

### Lessons Learned Form

QTR. 20 12

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> 1. Jan. - Mar. | <input type="checkbox"/> 3. Jul. - Sept. |
| <input type="checkbox"/> 2. Apr. - June            | <input type="checkbox"/> 4. Oct. - Dec.  |

1. Project Title: Blue Line State Street Station Renovation

2. Contract #: S09CN11

3. Lessons Learned #: 001

4. Date: 01/11/2012

5. Project Delivery Method

- Design - Bid - Build
- Design Build
- CM @ Risk

6. Phase:

- Conceptual Design of 15%
- Preliminary Design 15% - 60%
- Final Design 60% - 100%
- Procurement
- Construction

7. Project Classification:

- |  |   |
|--|---|
| <input type="checkbox"/> System Improvement            | <input type="checkbox"/> Maintenance Facility Improvement |
| <input type="checkbox"/> Parking Lot                   | <input type="checkbox"/> New Elevator                     |
| <input type="checkbox"/> Roadway                       | <input type="checkbox"/> Replacement Elevator             |
| <input type="checkbox"/> Commuter Rail                 | <input type="checkbox"/> Parking Garage                   |
| <input type="checkbox"/> Bridge                        | <input type="checkbox"/> Light Rail Right-of-Way          |
| <input checked="" type="checkbox"/> Station Renovation | <input type="checkbox"/> New Vertical Construction        |
| <input type="checkbox"/> New Capital Expansion         | <input type="checkbox"/> Environmental                    |
| <input type="checkbox"/> Noise Wall                    | <input type="checkbox"/> Heavy Civil                      |
| <input type="checkbox"/> Building Demo                 | <input type="checkbox"/> Signal/Comm./Power               |

8. Lessons Learned Affected Category:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Scope | <input checked="" type="checkbox"/> Time       |
| <input checked="" type="checkbox"/> Cost  | <input checked="" type="checkbox"/> Management |

9. Is this a safety related lesson?  Yes  No

10. Title of Lessons Learned: Fire Alarm Design and Installation

11. Background:

The design efforts on the Blue Line State Station Renovation began in earnest in 1995 and the so call 100% design went out to bid and was awarded late in 2004. As of the writing of this report (January 2012) the permanent full functioning Fire Alarm System is still not completely operation with final Boston Fire Department (BFD) acceptance a month or two away. This condition is a result of primarily a lack of designer and contractor coordination with BFD.

12. Lessons Learned Challenges (what needs improvement or what went well?):

The first challenge is with the basic design process and communication with The Department of Public Safety and Boston Fire Department (DPS/BFD). Many elements of the system required changing due to confusion of building code ambiguities with mutable editions of code change triggered from 1995 to 2011. The second challenge related to the Fire Alarm System is scope creep. The original design was strictly related to the Blue Line Station of the State Street Station complex which also houses the orange line. Since 2004 The DPS/BFD request the orange line and the blue line be services by on fire alarm system causing a significant domino effect of changes. By adding the scope of the Orange Line to the project the level of effort related to the fire alarm more than doubled do to the fact the orange line section of the station is far more complicated by size and accessibility to the station infrastructure. The third challenge is the DPS/BFD only walks down site conditions near completion and many design elements on the design document are re-addressed and modified. SEE ATTACHED

13. Lessons Learned Recommendations (how would you improve or avoid or why do you think it went so well?):

The first is relatively easy to resolve at the early stages of a project the designer and the MBTA project manager should submit 30%, 60% and 90% drawings to DPS/BFD with a face to face follow up coordination meeting after review. In my professional opinion the DPS/BFD personnel are by nature tactile in their understanding of code requirements. For example if a drawing shows FA pull station every 300 ft. they have no issue, but in the field after the support columns are built the pull station has obstructed view they will require relocation. It is the designer's responsibility to go beyond code requirements and adapt code correctly to each project. Good continues communication throughout the design process should reduce this challenge. The second challenge is scope creep. This occurs when there is not a clear understanding of site field conditions. Just as in the design phase, the DPS/BFD should make a site visit with the designer and the MBTA Fire Alarm Service Company at 30% 60% and 90% completion point in the project. This interim inspection could be incorporated into the construction schedule with some cost loaded value. The third challenge is almost inevitable to some degree when a fire alarm system is being tested it in most likely hood will require modifications to work as intended to satisfy MBTA OCC, MBTA Fire Alarm Service Company and DPS/BFD. By addressing the first two challenges the third challenge can be reduced to a minimum. SEE ATTACHED

14. Applicability:

The DPS/BFD needs to buy into the complete project process.

1. Informed in writing of project in development.
2. Review and follow up meeting at 30%, 60% and 90% design.
3. Interim field inspection with designer at 30% 60% and 90% of construction phasing.
4. Cost load or Allowance for FA system Start Up and Testing.

Submitted by: Terrence P. McCarthy

Telephone #: 617-222-4166 Email: tpmccarthy@mbta.com

MBTA S09CN11

Blue Line State Street Station – Lesson Learned

Fire Alarm System Design & Installation

Date 10/12/2012

Project Manager: Terry McCarthy x4166

Background:

The design efforts on the Blue Line State Station Renovation began in earnest in 1995 and the so call 100% design went out to bid and was awarded late in 2004. As of the writing of this report (January 2012) the permanent full functioning Fire Alarm System is still not completely operation with final Boston Fire Department (BFD) acceptance a month or two away. This condition is a result of primarily a lack of designer and contractor coordination with BFD.

Lesson Learned Challenges:

The first challenge is with the basic design process and communication with The Department of Public Safety and Boston Fire Department (DPS/BFD). Many elements of the system required changing due to confusion of building code ambiguities with mutable editions of code change triggered from 1995 to 2011.

The second challenge related to the Fire Alarm System is scope creep. The original design was strictly related to the Blue Line Station of the State Street Station complex which also houses the orange line. Since 2004 The DPS/BFD request the orange line and the blue line be services by on fire alarm system causing a significant domino effect of changes. By adding the scope of the Orange Line to the project the level of effort related to the fire alarm more than doubled do to the fact the orange line section of the station is far more complicated by size and accessibility to the station infrastructure.

The third challenge is the DPS/BFD only walks down site conditions near completion and many design elements on the design document are re-addressed and modified.

Lesson Learned Recommendations:

The first is relatively easy to resolve at the early stages of a project the designer and the MBTA project manager should submit 30%, 60% and 90% drawings to DPS/BFD with a face to face follow up coordination meeting after review. In my professional opinion the DPS/BFD personnel are by nature tactile in their understanding of code requirements. For example if a drawing shows FA pull station every 300 ft. they have no issue, but in the field after the support columns are built the pull station has obstructed view they will require relocation. It is the designer's responsibility to go beyond code

requirements and adapt code correctly to each project. Good continues communication throughout the design process should reduce this challenge.

The second challenge is scope creep. This occurs when there is not a clear understanding of site field conditions. Just as in the design phase, the DPS/BFD should make a site visit with the designer and the MBTA Fire Alarm Service Company at 30% 60% and 90% completion point in the project. This interim inspection could be incorporated into the construction schedule with some cost loaded value.

The third challenge is almost inevitable to some degree when a fire alarm system is being tested it in most likely hood will require modifications to work as intended to satisfy MBTA OCC, MBTA Fire Alarm Service Company and DPS/BFD. By addressing the first two challenges the third challenge can be reduced to a minimum.

#### Application

The DPS/BFD needs to buy into the complete project process.

1. Informed in writing of project in development.
2. Review and follow up meeting at 30%, 60% and 90% design.
3. Interim field inspection with designer at 30% 60% and 90% of construction phasing.
4. Cost load or Allowance for FA system Start Up and Testing.