LAFAYETTE
ENGINEERING COMPANY

Department of Civil and Environmental Engineering
Lafayette College
-
CE473 – Senior Capstone Design I
Spring 2015

CONSTRUCTION SEQUENCE & BUDGET

From: **Sarah Walko & Gabriel Hernandez**

Group: Construction Management Team

Title: Construction Sequence & Budget

Executive Summary:

The purpose of this report is to outline the construction sequence and budget for the proposed inclined elevator as a solution to enhance the connection between College Hill, the Arts Campus, and the Downtown Easton community. This alignment extends from the area between Easton Hall and Ruef Hall to the parking lot behind the Spot. In the report, a general overview of the necessary staging and sequencing options and budget by the Lafayette Engineering Senior Capstone Class can be found.

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1. Introduction

1.1 Overview

The construction sequencing and budget for the proposed inclined elevator are based on the different aspects of the project: site civil improvements, foundations, elevator, landings, plaza, and College Ave. improvements. The project is comprised of four main construction zones: (1) Lafayette College Intermodal Welcoming Center at the base of the inclined elevator. This will be referred to as the Spot Landing or "Lower Landing." (2) A weather-protected landing for the inclined elevator at the top of the escarpment accessing Lafayette; main campus. This will be referred to as the Marquis Landing or "Upper Landing". (3) Pedestrian and traffic calming improvements to College Ave. This will be referred to with College Avenue Improvements. (4) Pedestrian and recreational improvements to the area behind the Spot building to be used as a pedestrian plaza connecting the intersection of key points in the City of Easton: Stirner Arts Trail, route down 3rd Street to Downtown Easton, College Hill via College Ave, and Lafayette's Marquis and William's campuses. This will be referred to as Lafayette Square.

1.2 Phases & Improvements

For this project, there will be three phases in the construction sequence: pre-construction, construction, and post-construction. The first phase, pre-construction, covers construction vehicles road accessing, establishing the takeoff area, and the landing locations. In addition, it includes site clearing and installation of temporary site security fencing. The second phase, the main construction phase, includes micropile installation, and building the superstructure for the incline elevator. Also, this section includes building the Lafayette College Intermodal Welcoming Center at the base and a weather-protected landing. The Lafayette College Intermodal Welcoming Center will consist of a platform connect the landing building to the Spot and N. 3rd Street. The last phase,

the post-construction includes final restoration of all disturbed areas and punch list items. Inspections will be required during all phases of the project.

The project is estimated to start March 7, 2016 and end November 16, 2017 with current assumptions. A schedule has been mapped out to show the durations of each activity and phase (The Gantt chart for the activities can be found in Appendix A). A visual representation of the sequencing and affected areas during construction is located in:

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2. Pre-Construction

2.1 Detour Route around Bushkill Dr.

- Block off Bushkill Dr. from N. 3rd St to Sullivan Rd. to general public
- Establishing limited access for residents along the road and emergency services
- Establish detour routes using western Bushkill Dr. and College Ave to get up to College Hill

2.2 Construction Access Roads

- Construction vehicle access to Bushkill Dr. from either end of Sullivan Rd. or 3rd St. to start. When final construction of Lafayette Square improvements begin, access will be limited to entry from west of Sullivan Rd
- Construction access at the Marquis landing will be via Sullivan Rd to W. Campus Lane, a pathway will be constructed for the remaining distance to the staging site between Easton Hall and Reuf Hall

2.3 Secure Site

- Fences will be erected around the inclined elevator lower and upper construction areas

2.4 Mobilize Material and Equipment to Site

- Place construction/micropile/crane machinery on site
- Stockpile construction materials on site as necessary according to established construction schedules

2.5 Prepare Alignment

- Remove vegetation and other obstructions on slope, starting, and landing points

2.6 Locate/Mark Starting and Landing Locations

- Stakeout the boundaries of the Spot & marquis landing sites

2.7 Locate/Mark Pillar Locations

- Stakeout the micropile locations for drilling

3. Construction

3.1 Spot Landing/Incline Elevator

3.1.1 Outfall

3.1.2 Site Preparation and Utilities

3.1.3 Landing Foundations

3.1.4 Landing Platform including Concrete Deck and Retaining Wall

3.1.5 Pier 1

3.1.6 Temporary Ramp, Pier 2 Foundation and Test

3.1.7 Pier 1 (Pile Cap, Pier, Hammer Beam, Remove Cap)

3.1.8 Spanning Beam, Pier 1 to Pier 2

3.1.9 Repeat Sections 3.1.5 to 3.1.8 for (9) Piers

3.1.10 Marquis Landing and Superstructure

3.1.11 Finish Superstructure

3.1.12 Track Installation and Stairs

3.1.13 Pre-commission Inclined Elevator

3.1.14 Intermodal Welcoming & Intermodal Center Construction

3.1.15 Envelope Complete, Interior Fit-Out

3.1.16 Final Commissioning

3.2 Marquis Landing

3.2.1 Mobilization

3.2.2 Erosion and Sediment Control

3.2.3 Site Preparations and Utilities

3.2.4 Build Access Road

3.2.5 Foundations

3.2.6 Building and Mechanical Components

3.2.7 Raised Path and Resistant Wall Foundations

3.2.8 Raised Path

3.2.9 Finish Building and Path

3.2.10 Finish Grading and Walkway Connection

3.2.11 Restoration

3.2.12 Final Mechanical Installation

3.2.13 Pre-Commission Inclined Elevator

3.3 Plaza

3.3.1 Plaza Construction

3.3.2 Stream Stabilization

3.3.3 Repave Bushkill Dr.

3.4 College Ave. Pedestrian Improvements

3.4.1 Mobilization

3.4.2 E&S

3.4.3 Curb Sidewalk

3.4.4 Median

3.4.5 Pave and Traffic Calming

3.4.6 Signage and Landscaping

3.4.7 3rd St. Improvements

3.4.8 Re-Pave

4. Post-Construction

4.1 Remove Equipment and Remaining Materials

- Remove all equipment and remaining materials from site in order to begin/continue site beautification

4.2 Landscape Site

- Any extra soil will be removed from site prior to this
- Add grass, trees, shrubs, flowers, etc to site

4.3 Punch List Items

- Walkthrough by architect to verify all aspects are up to standard
- Any punch list items taken care of

4.4 Remove Construction Vehicle Access/Fences

- Remove all temporary pathways and fences to site

4.5 Certificate of Occupancy/Inspections

- Obtain C of O and make sure all inspections are passed

5. Scheduling & Budget

5.1 Gantt Chart

The Gantt chart for the project activities can be found in Appendix A.

5.2 Schedule Report

Early and late start and finish dates and a total float analysis can be found in Appendix B.

5.3 Cost Analysis

5.3.1 Site Civil Items

The site civil items estimate cost can be found in Appendix C. This estimate includes overhead, erosion and sediment control, earthwork, storm sewer, utilities, road and walkways, landscaping, lighting, signs and signals, as well as other miscellaneous items. The cost estimate was found to be around 3 million using data from RSMeans (2014).

5.3.2 Foundations

The foundation cost estimates can be found in Appendix D, Table 1. This estimate was completed using 7” diameter micropiles at an average cost of $170 per lf. In addition, required quantities of concrete and reinforcement steel were provided by the Geotechnical team. The total cost for the micropiles was found to be around $2.7 million.

5.3.3 Elevator and Superstructure

The elevator and superstructure cost estimate can be found in Appendix D, Table 2. This estimate cost was determined using the cost per lf of I-beams, mainly using the W27X194 and S8X23. In addition, we were provided by the structures team with required concrete and reinforcing steel for the piers. The total cost was found to be about $600,000.

5.3.4 Lafayette Welcoming & Intermodal center

The cost estimate can be found in Appendix D, Table 4. This estimate was determined using similar size buildings. We determined this building to cost $3.1 million to $3.5 million.

5.3.5 College Ave. Improvements

The College Ave. improvement costs estimate can be found in Appendix D, Table 3. This estimate includes: improvements to sidewalks, creation of median, and placement of traffic calming items. We determined the cost improvements to be $180,000 to $210,000.

6. Conclusion

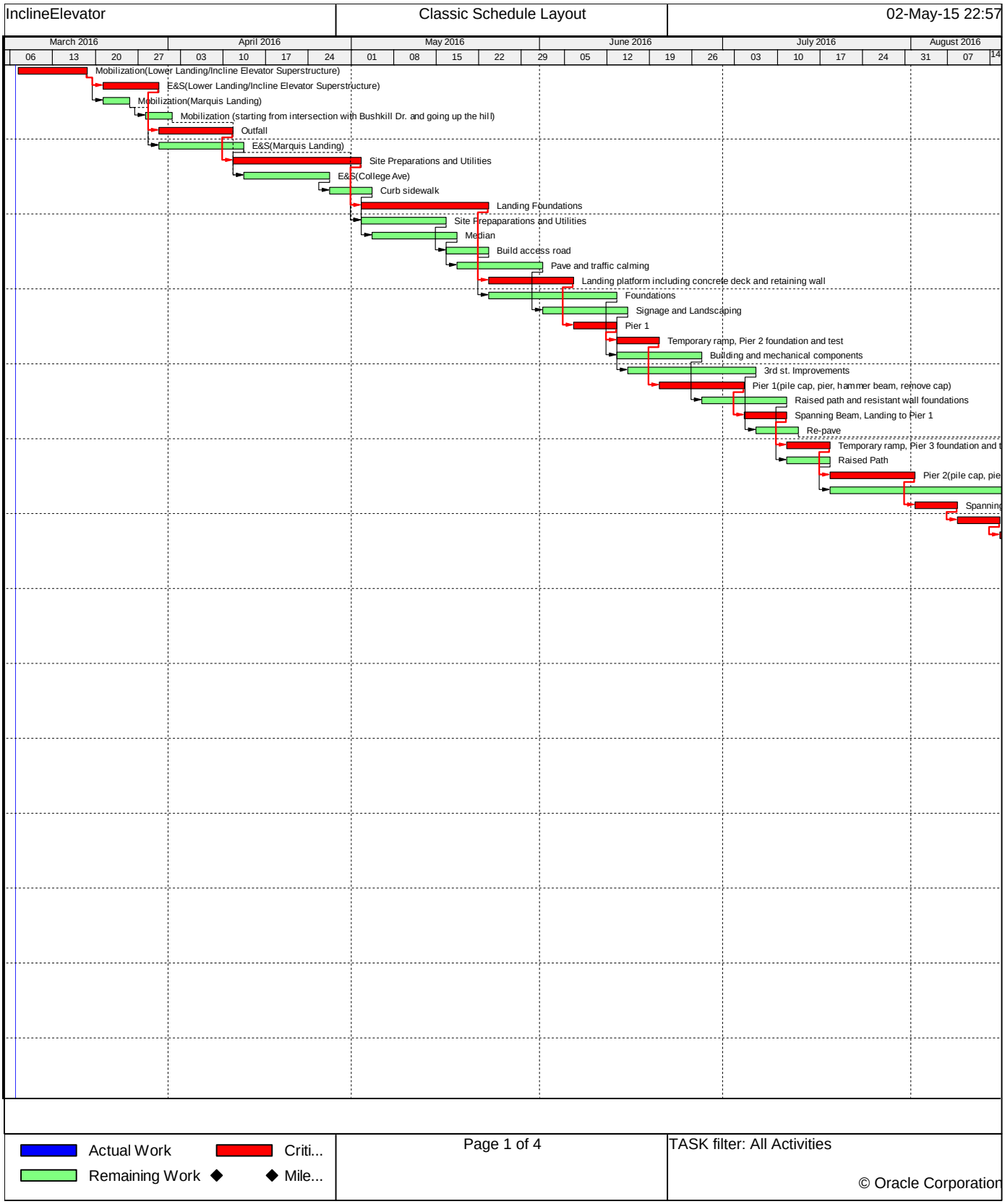
6.1 Construction Sequence

The overall sequence of construction will take place over 21 months with different aspects of the project being site civil improvements, foundations, elevator, landings, plaza, and College Ave. improvements. The project consists of four main construction zones: the Lafayette College Intermodal Welcoming Center; the Marquis Landing; College Avenue improvements; and a pedestrian plaza behind the Spot. Each of these locations overlap within the construction schedule beginning on March 7, 2016 and finished on November 16, 2017.

6.2 Project Budget

The cost estimations were completed using RSMeans 2014, however, due to the complexity of working in a very steep slope, we used higher values than suggested by RSMeans in some areas.

Our project final cost estimate was determined to be around $11 million. The breakdown of this cost includes: site civil, foundations, incline elevator and superstructure, Lafayette Welcoming & Intermodal center, as well as College Ave. improvements. Each cost can be found in the Appendix D, Table 4: Cost Estimate Summary. Lastly, in order to maintain the elevator and structure, it will be necessary to pay an additional $20,000 per year for O&M life-cycle costs.


InclineElevator
Classic Schedule Layout
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March 2016
April 2016
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Mobilization(Lower Landing/Incline Elevator Superstructure)
E&S(Lower Landing/Incline Elevator Superstructure)
Mobilization(Marquis Landing)
Mobilization (starting from intersection with Bushkill Dr. and going up the hill)
Outfall
E&S(Marquis Landing)
Site Preparations and Utilities
E&S(College Ave)
Curb sidewalk
Landing Foundations
Site Prepaparations and Utilities
Median
Build access road
Pave and traffic calming
Landing platform including concrete deck and retaining wall
Foundations
Signage and Landscaping
Pier 1
Temporary ramp, Pier 2 foundation and test
Building and mechanical components
3rd st. Improvements
Pier 1(pile cap, pier, hammer beam, remove cap)
Raised path and resistant wall foundations
Spanning Beam, Landing to Pier 1
Re-pave
Temporary ramp, Pier 3 foundation and t
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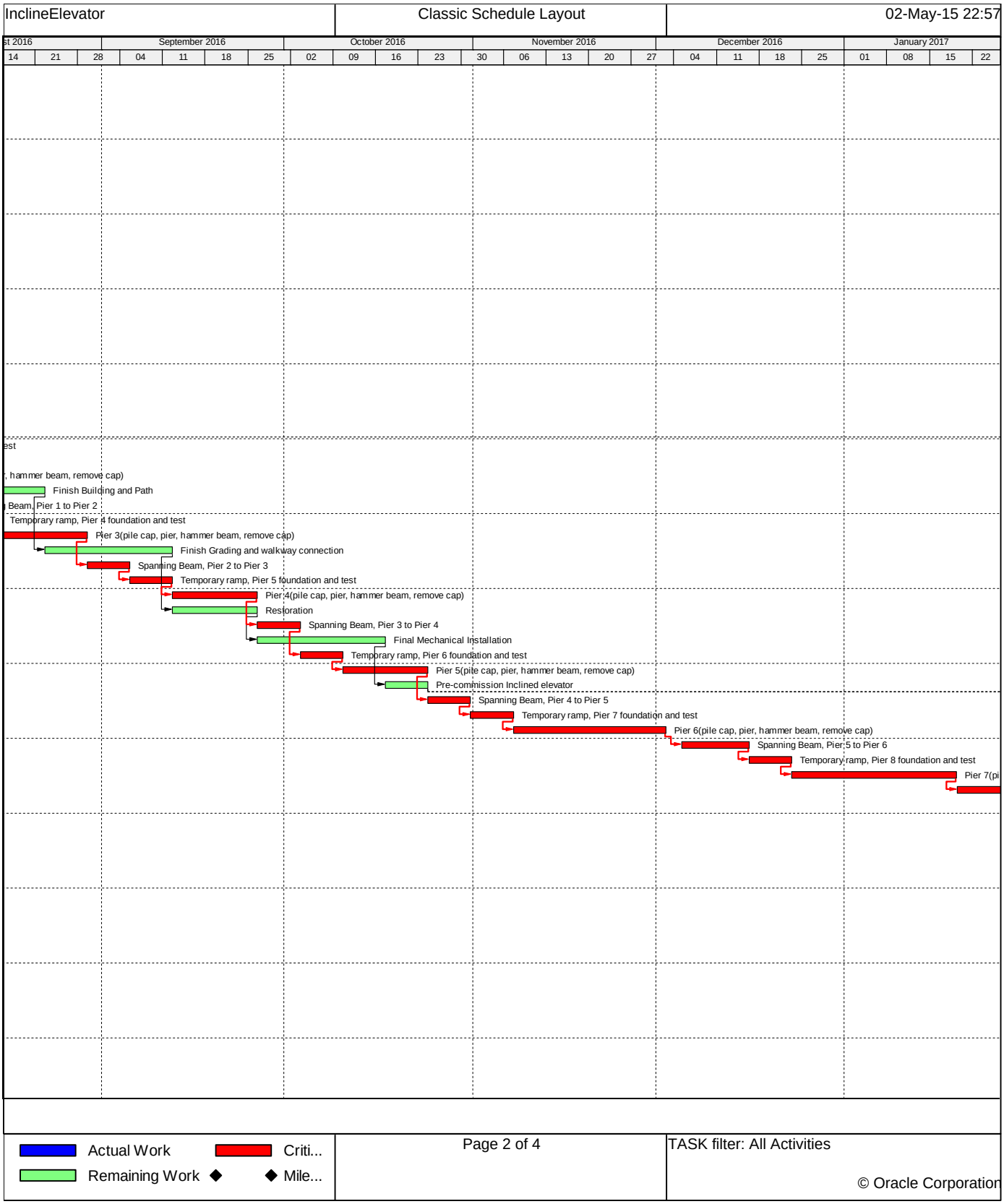
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, hammer beam, remove cap)
Finish Building and Path
Beam, Pier 1 to Pier 2
Temporary ramp, Pier 4 foundation and test
Pier 3(pile cap, pier, hammer beam, remove cap)
Finish Grading and walkway connection
Spanning Beam, Pier 2 to Pier 3
Temporary ramp, Pier 5 foundation and test
Pier 4(pile cap, pier, hammer beam, remove cap)
Restoration
Spanning Beam, Pier 3 to Pier 4
Final Mechanical Installation
Temporary ramp, Pier 6 foundation and test
Pier 5(pile cap, pier, hammer beam, remove cap)
Pre-commission Inclined elevator
Spanning Beam, Pier 4 to Pier 5
Temporary ramp, Pier 7 foundation and test
Pier 6(pile cap, pier, hammer beam, remove cap)
Spanning Beam, Pier 5 to Pier 6
Temporary ramp, Pier 8 foundation and test
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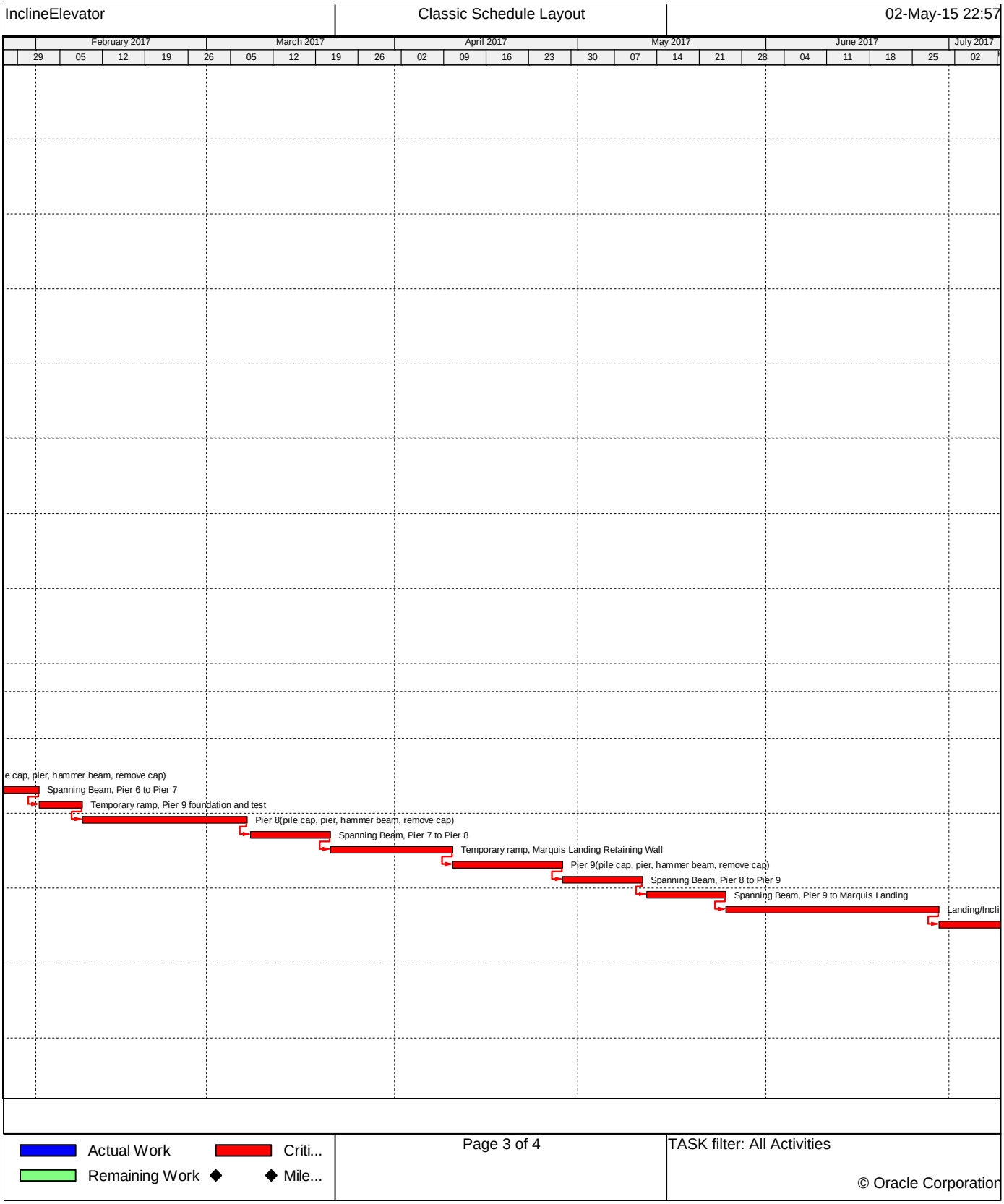
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Spanning Beam, Pier 6 to Pier 7
Temporary ramp, Pier 9 foundation and test
Pier 8(pile cap, pier, hammer beam, remove cap)
Spanning Beam, Pier 7 to Pier 8
Temporary ramp, Marquis Landing Retaining Wall
Pier 9(pile cap, pier, hammer beam, remove cap)
Spanning Beam, Pier 8 to Pier 9
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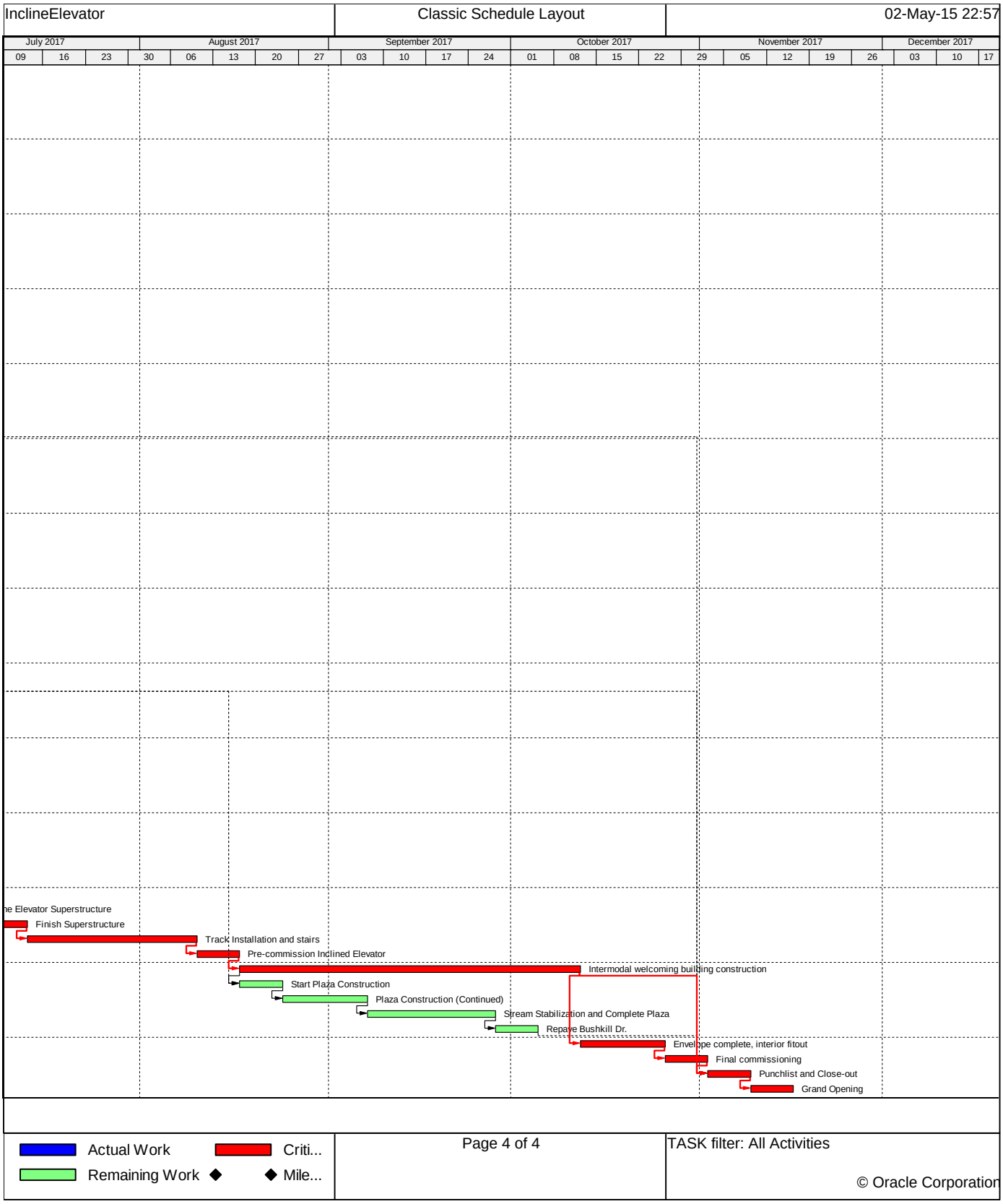
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he Elevator Superstructure
Finish Superstructure
Track Installation and stairs
Pre-commission Inclined Elevator
Intermodal welcoming building construction
Start Plaza Construction
Plaza Construction (Continued)
Stream Stabilization and Complete Plaza
Repave Bushkill Dr.
Envelope complete, interior fitout
Final commissioning
Punchlist and Close-out
Grand Opening
Actual Work
Criti...
Remaining Work
Mile...
Page 4 of 4
TASK filter: All Activities
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SR-01 Classic Schedule Report - Sort by ES, TF

Activity ID	Activity Name	Original Duration	Remaining Duration	Units % Complete	Start	Finish	Late Start	Late Finish	Total Float
A1000	Mobilization(Lower Landing/Incline Elevator Superstructure)	2w	2w	0%	07-Mar-16	18-Mar-16	07-Mar-16	18-Mar-16	0w
A1010	E&S(Lower Landing/Incline Elevator Superstructure)	1w	1w	0%	21-Mar-16	30-Mar-16	21-Mar-16	30-Mar-16	0w
A1490	Mobilization(Marquis Landing)	1w	1w	0%	21-Mar-16	25-Mar-16	02-Mar-17	09-Mar-17	50w
A1660	Mobilization (starting from intersection with Bushkill Dr. and going up the hill)	1w	1w	0%	28-Mar-16	01-Apr-16	27-Jul-17	03-Aug-17	70w
A1020	Outfall	2w	2w	0%	30-Mar-16	11-Apr-16	30-Mar-16	11-Apr-16	0w
A1500	E&S(Marquis Landing)	2w	2w	0%	30-Mar-16	13-Apr-16	09-Mar-17	23-Mar-17	49w
A1030	Site Preparations and Utilities	3w	3w	0%	11-Apr-16	02-May-16	11-Apr-16	02-May-16	0w
A1670	E&S(College Ave)	2w	2w	0%	13-Apr-16	27-Apr-16	03-Aug-17	17-Aug-17	68w
A1680	Curb sidewalk	1w	1w	0%	27-Apr-16	04-May-16	17-Aug-17	24-Aug-17	68w
A1040	Landing Foundations	3w	3w	0%	02-May-16	23-May-16	02-May-16	23-May-16	0w
A1510	Site Prepaparations and Utilities	2w	2w	0%	02-May-16	16-May-16	23-Mar-17	06-Apr-17	47w
A1690	Median	2w	2w	0%	04-May-16	18-May-16	24-Aug-17	07-Sep-17	68w
A1520	Build access road	1w	1w	0%	16-May-16	23-May-16	06-Apr-17	13-Apr-17	47w
A1700	Pave and traffic calming	2w	2w	0%	18-May-16	01-Jun-16	07-Sep-17	21-Sep-17	68w
A1050	Landing platform including concrete deck and retaining wall	2w	2w	0%	23-May-16	06-Jun-16	23-May-16	06-Jun-16	0w
A1530	Foundations	3w	3w	0%	23-May-16	13-Jun-16	13-Apr-17	04-May-17	47w
A1710	Signage and Landscaping	2w	2w	0%	01-Jun-16	15-Jun-16	21-Sep-17	05-Oct-17	68w
A1060	Pier 1	1w	1w	0%	06-Jun-16	13-Jun-16	06-Jun-16	13-Jun-16	0w
A1070	Temporary ramp, Pier 2 foundation and test	1w	1w	0%	13-Jun-16	20-Jun-16	13-Jun-16	20-Jun-16	0w
A1540	Building and mechanical components	2w	2w	0%	13-Jun-16	27-Jun-16	04-May-17	18-May-17	47w
A1720	3rd st. Improvements	3w	3w	0%	15-Jun-16	06-Jul-16	05-Oct-17	26-Oct-17	68w
A1080	Pier 1(pile cap, pier, hammer beam, remove cap)	2w	2w	0%	20-Jun-16	04-Jul-16	20-Jun-16	04-Jul-16	0w
A1550	Raised path and resistant wall foundations	2w	2w	0%	27-Jun-16	11-Jul-16	18-May-17	01-Jun-17	47w
A1090	Spanning Beam, Landing to Pier 1	1w	1w	0%	04-Jul-16	11-Jul-16	04-Jul-16	11-Jul-16	0w
A1730	Re-pave	1w	1w	0%	06-Jul-16	13-Jul-16	26-Oct-17	02-Nov-17	68w
A1100	Temporary ramp, Pier 3 foundation and test	1w	1w	0%	11-Jul-16	18-Jul-16	11-Jul-16	18-Jul-16	0w
A1560	Raised Path	1w	1w	0%	11-Jul-16	18-Jul-16	01-Jun-17	08-Jun-17	47w
A1110	Pier 2(pile cap, pier, hammer beam, remove cap)	2w	2w	0%	18-Jul-16	01-Aug-16	18-Jul-16	01-Aug-16	0w
A1570	Finish Building and Path	5w	5w	0%	18-Jul-16	22-Aug-16	08-Jun-17	13-Jul-17	47w
A1120	Spanning Beam, Pier 1 to Pier 2	1w	1w	0%	01-Aug-16	08-Aug-16	01-Aug-16	08-Aug-16	0w
A1130	Temporary ramp, Pier 4 foundation and test	1w	1w	0%	08-Aug-16	15-Aug-16	08-Aug-16	15-Aug-16	0w
A1140	Pier 3(pile cap, pier, hammer beam, remove cap)	2w	2w	0%	15-Aug-16	29-Aug-16	15-Aug-16	29-Aug-16	0w
A1580	Finish Grading and walkway connection	3w	3w	0%	22-Aug-16	12-Sep-16	13-Jul-17	03-Aug-17	47w
A1150	Spanning Beam, Pier 2 to Pier 3	1w	1w	0%	29-Aug-16	05-Sep-16	29-Aug-16	05-Sep-16	0w
A1160	Temporary ramp, Pier 5 foundation and test	1w	1w	0%	05-Sep-16	12-Sep-16	05-Sep-16	12-Sep-16	0w
A1170	Pier 4(pile cap, pier, hammer beam, remove cap)	2w	2w	0%	12-Sep-16	26-Sep-16	12-Sep-16	26-Sep-16	0w
A1590	Restoration	2w	2w	0%	12-Sep-16	26-Sep-16	03-Aug-17	17-Aug-17	47w
A1180	Spanning Beam, Pier 3 to Pier 4	1w	1w	0%	26-Sep-16	03-Oct-16	26-Sep-16	03-Oct-16	0w
A1600	Final Mechanical Installation	3w	3w	0%	26-Sep-16	17-Oct-16	17-Aug-17	07-Sep-17	47w
A1190	Temporary ramp, Pier 6 foundation and test	1w	1w	0%	03-Oct-16	10-Oct-16	03-Oct-16	10-Oct-16	0w
A1200	Pier 5(pile cap, pier, hammer beam, remove cap)	2w	2w	0%	10-Oct-16	24-Oct-16	10-Oct-16	24-Oct-16	0w
A1610	Pre-commission Inclined elevator	1w	1w	0%	17-Oct-16	24-Oct-16	07-Sep-17	14-Sep-17	47w
A1210	Spanning Beam, Pier 4 to Pier 5	1w	1w	0%	24-Oct-16	31-Oct-16	24-Oct-16	31-Oct-16	0w
A1220	Temporary ramp, Pier 7 foundation and test	1w	1w	0%	31-Oct-16	07-Nov-16	31-Oct-16	07-Nov-16	0w
A1230	Pier 6(pile cap, pier, hammer beam, remove cap)	4w	4w	0%	07-Nov-16	02-Dec-16	07-Nov-16	02-Dec-16	0w
A1240	Spanning Beam, Pier 5 to Pier 6	2w	2w	0%	05-Dec-16	16-Dec-16	05-Dec-16	16-Dec-16	0w
A1250	Temporary ramp, Pier 8 foundation and test	1w	1w	0%	16-Dec-16	23-Dec-16	16-Dec-16	23-Dec-16	0w
A1260	Pier 7(pile cap, pier, hammer beam, remove cap)	4w	4w	0%	23-Dec-16	19-Jan-17	23-Dec-16	19-Jan-17	0w
A1270	Spanning Beam, Pier 6 to Pier 7	2w	2w	0%	19-Jan-17	01-Feb-17	19-Jan-17	01-Feb-17	0w
A1280	Temporary ramp, Pier 9 foundation and test	1w	1w	0%	01-Feb-17	08-Feb-17	01-Feb-17	08-Feb-17	0w
A1290	Pier 8(pile cap, pier, hammer beam, remove cap)	4w	4w	0%	08-Feb-17	07-Mar-17	08-Feb-17	07-Mar-17	0w
A1300	Spanning Beam, Pier 7 to Pier 8	2w	2w	0%	08-Mar-17	21-Mar-17	08-Mar-17	21-Mar-17	0w
A1310	Temporary ramp, Marquis Landing Retaining Wall	3w	3w	0%	21-Mar-17	10-Apr-17	21-Mar-17	10-Apr-17	0w
A1320	Pier 9(pile cap, pier, hammer beam, remove cap)	3w	3w	0%	10-Apr-17	28-Apr-17	10-Apr-17	28-Apr-17	0w
A1330	Spanning Beam, Pier 8 to Pier 9	2w	2w	0%	28-Apr-17	11-May-17	28-Apr-17	11-May-17	0w
A1360	Spanning Beam, Pier 9 to Marquis Landing	2w	2w	0%	12-May-17	25-May-17	12-May-17	25-May-17	0w
A1400	Landing/Incline Elevator Superstructure	5w	5w	0%	25-May-17	29-Jun-17	25-May-17	29-Jun-17	0w
A1410	Finish Superstructure	2w	2w	0%	29-Jun-17	13-Jul-17	29-Jun-17	13-Jul-17	0w
A1420	Track Installation and stairs	4w	4w	0%	13-Jul-17	10-Aug-17	13-Jul-17	10-Aug-17	0w
A1430	Pre-commission Inclined Elevator	1w	1w	0%	10-Aug-17	17-Aug-17	10-Aug-17	17-Aug-17	0w
A1440	Intermodal welcoming building construction	8w	8w	0%	17-Aug-17	12-Oct-17	17-Aug-17	12-Oct-17	0w
A1620	Start Plaza Construction	1w	1w	0%	17-Aug-17	24-Aug-17	14-Sep-17	21-Sep-17	4w
A1630	Plaza Construction (Continued)	2w	2w	0%	24-Aug-17	07-Sep-17	21-Sep-17	05-Oct-17	4w
A1640	Stream Stabilization and Complete Plaza	3w	3w	0%	07-Sep-17	28-Sep-17	05-Oct-17	26-Oct-17	4w
A1650	Repave Bushkill Dr.	1w	1w	0%	28-Sep-17	05-Oct-17	26-Oct-17	02-Nov-17	4w
A1450	Envelope complete, interior fitout	2w	2w	0%	12-Oct-17	26-Oct-17	12-Oct-17	26-Oct-17	0w
A1460	Final commissioning	1w	1w	0%	26-Oct-17	02-Nov-17	26-Oct-17	02-Nov-17	0w
A1470	Punchlist and Close-out	1w	1w	0%	02-Nov-17	09-Nov-17	02-Nov-17	09-Nov-17	0w
A1480	Grand Opening	1w	1w	0%	09-Nov-17	16-Nov-17	09-Nov-17	16-Nov-17	0w

Attachment C

SITE CIVIL ITEMS

ITEM #	DESCRIPTION	QTY.	UNITS	UNIT COST $/UNIT	COST $
1.0	**Overhead**				
1.01	Mobilization & Closeout	1	LS	$40,000.00	$40,000.00
1.02	Maintenance & Protection of Traffic	1	LS	$50,000.00	$50,000.00
2.0	**Erosion & Sediment Control**				
2.01	Rock Construction Entrance	2	EA	$5,000.00	$10,000.00
2.02	Inlet protection	3	EA.	$250.00	$750.00
2.03	12" Silt Sock	392	LF	$2.00	$784.00
2.04	18" Silt Sock	831	LF	$2.50	$2,077.50
3.0	**Earthwork**				
3.01	Class 2 excavation	1500	CY	$8.00	$12,000.00
3.02	Class _ excavation (blasting)	7500	CY	$100.00	$750,000.00
3.03	Fill, relocate suitable on-site material	1000	CY	$75.00	$75,000.00
3.04	Fill, furnish and place	500	CY	$80.00	$40,000.00
3.05	Minor grading +/- 2 ft. using suitable on-site material material	1200	SY	$60.00	$72,000.00
3.06	Subgrade preparation (incl.)	-	-	-	$0.00
3.07	Unsuitable subgrade - 2A stone, compacted	500	CY	$150.00	$75,000.00
3.08	Unsuitable subgrade - #3 Stone	500	CY	$100.00	$50,000.00
3.09	Unsuitable subgrade - Class 4 geotextile (subbase reinforcement)	1000	SY	$200.00	$200,000.00
4.0	**Storm Sewer**				
	24" RCP	3000	LF	$62.00	$186,000.00
	8" DIP	3000	LF	$50.00	$150,000.00
	48" dia. manhole	2	EA.	$3,500.00	$7,000.00
	48" dia. doghouse manhole	1	EA.	$5,000.00	$5,000.00
	Std. Inlet, M-Top w/ bicycle safe grate	2	EA.	$250.00	$500.00
	C-Top type curb inlet with pipe discharge w/ bicycle safe vane grates	2	EA.	$4,000.00	$8,000.00
	Endwall with energy dissipator apron	3	EA.	$20,000.00	$60,000.00
5.0	**Utilities**				
	6" DIP water	1500	LF	$61.50	$92,250.00
	3" DIP water	1500	LF	$38.00	$57,000.00
	6" DIP water valve	5	EA.	$40.00	$200.00
	3" DIP water valve	5	EA.	$35.00	$175.00
	Post-Indicator Valve	1	EA.	$1,300.00	$1,300.00
	Transformer (at Marquis landing)	2	EA.	$28,400.00	$56,800.00
Roads and Walkways					
	Class A concrete curb	80	LF	$18.00	$1,440.00
	Class A concrete mountable curb	800	LF	$29.00	$23,200.00
	Class A concrete sidewalk pavement (incl. curb ramps and tapers)	6912	SY	$46.00	$317,952.00
	ADA Detectable Warning Strip - cast iron	6	EA.	$84.00	$504.00
	Belgian block curb	1000	LF	$15.35	$15,350.00
	Brick pavement - over sand with polymeric sand	3000	SY	$14.00	$42,000.00
	Brick pavement - mortared over concrete pavement	3000	SY	$19.00	$57,000.00
	Cobblestone rumble strip	500	SY	$28.00	$14,000.00
	Roller compacted concrete, 5"	2000	SY	$45.00	$90,000.00
	25mm HMA, 5"	6	TON	$105.00	$630.00
	19mm HMA, 2"	5	TON	$85.00	$425.00
	9.5mm HMA, 2"	4	TON	$75.00	$300.00
Landscaping					
	Dry-laid stone landscape wall	2000	SF	$32.00	$64,000.00
	Furnish and install topsoil, 5" min.	100	CY	$60.00	$6,000.00
	Furnish and install greenroof soil	200	CY	$120.00	$24,000.00
	Furnish and install greenroof seedums	10	EA.	$37.00	$370.00
	Furnish and install perennial flowers, grasses and vines	30	EA.	$25.00	$750.00
	Furnish and install shrubs	4	EA.	$54.50	$218.00
	Furnish and install deciduous trees	4	EA.	$560.00	$2,240.00
	Furnish and install evergreen trees	4	EA.	$206.00	$824.00
	Separation fabric (weed barrier)	1000	SY	$5.00	$5,000.00
	Landscape Mulch	2400	CY	$30.00	$72,000.00
Lighting					
	1.5" elecrical conduit	400	LF	$11.00	$4,400.00
	2" elecrical conduit	400	LF	$12.80	$5,120.00
	4" electrical conduit	400	LF	$32.50	$13,000.00
	Junction box	2	EA.	$16.00	$32.00
	Architectural Street Light, pole mount (20ft tall)	6	EA.	$1,625.00	$9,750.00
	Architectural Path Light, pole mount	6	EA.	$1,625.00	$9,750.00
	Architectural Area Light, building mount	6	EA.	$121.00	$726.00
	Low-voltage landscape and architectural building lighting	800	LS	$20.00	$16,000.00
Signs and Signals					
	R…., "STOP"	1	EA.	$280.00	$280.00
	R…., "DO NOT ENTER, AUTHORIZED VEHICLES ONLY"	1	EA.	$280.00	$280.00
	R…., Median sign	3	EA.	$280.00	$840.00
	R…., "NO LEFT TURN"	1	EA.	$280.00	$280.00
	O…., Object Marker (yellow diamond)	2	EA.	$280.00	$560.00
	R…., "NO PEDESTRIAN CROSSING"	2	EA.	$280.00	$560.00
	R…., "NO PARKING"	2	EA.	$280.00	$560.00
	R…., "HANDICAPPED PARKING"	3	EA.	$280.00	$840.00
	Cross-Walk Flashing Beacon - pushbutton activated	2	EA.	$5,425.00	$10,850.00
Micellaneous					
	Guiderail	740	LF	$10.00	$7,400.00
	Fence	4000	LF	$20.00	$80,000.00
	Architectural Railing	370	LF	$15.00	$5,550.00
	Bollard and chain, 8-ft bollard spacing	100	LF	$180.00	$18,000.00
	Building corner protection bollard	12	EA	$127.00	$1,524.00
	Epoxy pavement marking: Y/4"	200	LF	$0.34	$68.00
	Epoxy pavement marking: W/4"	200	LF	$0.34	$68.00
	Epoxy pavement marking: W/6"	200	LF	$0.57	$114.00
	Epoxy pavement marking: B/4"	200	LF	$0.34	$68.00
	Epoxy pavement marking: Handicapped Symbol	3	EA.	$75.00	$225.00
	Thermoplastic pavement marking: W/24" stop bar	200	LF	$3.34	$668.00
	Thermoplastic pavement marking: W/"STOP"	2	EA.	$7.00	$14.00
	Thermoplastic pavement marking: W/gore striping 18"W x 48"O.C.	200	LF	$2.28	$456.00
	Imprinted "brick" finish crosswak	5200	SF	$18.95	$98,540.00
				Total Cost:	$3,026,562.50

Appendix D

Table 1: Foundations Cost

Marquis Landing	Quantities	Cost per Unit	Cost Estimate
LF Micropile (7" Dia.)	99.67	170	$ 16,943
CY Yards Concrete	3451.44	102	$ 352,047
TON Steel Reinforcement	213.10	500	$ 106,549
SPOT Landing	Quantities	Cost per Unit	Cost Estimate
LF Micropile (7" Dia.)	2000.00	170	$ 340,000
CY Yards Concrete	16.67	102	$ 1,700
TON Steel Reinforcement	5.29	500	$ 2,646
Inclined Elevator	Quantities	Cost per Unit	Cost Estimate
LF Micropile (7" Dia.)	11332.56	170	$ 1,926,534
CY Yards Concrete	40.00	102	$ 4,080
TON Steel Reinforcement	8.20	500	$ 4,098
		Total Cost:	$ 2,754,598

Note: Micropiles cost $80-90 per ft. Due to difficulty of installation on slope, costs will be approximately $170 per ft.

Table 2: Incline elevator superstructure and cart cost estimate

Inclined Elevator Superstructure & Cart				
Section	Shape	Length (ft)	Cost (per foot)	Cost Estimate
W27X194	I/Wide Flange	1145	300	$ 343,559
S8X23	I/Wide Flange	1619	50.5	$ 81,772
		Quantities	Cost(per quantity)	Cost Estimate
Piers	Precast Concrete(per yd^3)	102	200	$ 20,400
	Reinforcing Steel(tons)	21	500	$ 10,500
Elevator cart				$ 100,000
			Total Cost:	$ 638,002

Table 3: College Ave. Pedestrian Improvements

Sidewalk	Cost per linear foot	Length (ft)	Cost
Concrete Sidewalk	13.05	1152	$ 15,034
Concrete Curb	23	240	$ 5,520
Median	Cost per ft^2	Area (ft^2)	
Concrete	7	2140	$ 14,980
Brick	3.8	640	$ 2,432
Other including: signage, rumble strips, cross-walk lighting, traffic calming, etc.			$120k-$170k
		Cost Estimate:	$180k-$210k

Table 4: Cost Estimate Summary

Items	**Cost Estimate**
Site Civil	$3,000,000
Foundations	$2,700,000
Inclined Elevator and landings(w/out foundations)	$2.9-$4.6 Million
Lafayette Welcoming & Intermodal center(incl. plaza)	$3.1-$3.5 Million
College Ave. Improvements	$180k-$210k
Project Total Cost Estimate:	**$ 11,000,000.00**