SR 288-L10 ABC Bridge Replacement

ABC-UTC at Florida International University
October 16, 2014

Louis J. Ruzzi, PE

District Bridge Engineer: PennDOT District 11-0

Nikki Bedillion, PE

Project Manager, JMT

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SR 288-L10 Existing Bridge

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SR 288-L10 Bid Tabs

Contractor	Contract Amount	No. Construction Days Bid	Bid Total
Joseph B. Fay Co.	1,685,859	9	$2,009,859
Clearwater Construction, Inc.	1,967,000	10	$2,327,000
Swank Construction Company, LLC	1,976,188	12	$2,408,188
Brayman Construction Corporation	1,798,067	17	$2,410,067
Golden Triangle Construction Company, Inc.	1,944,780	16	$2,520,780
MEKIS Construction Corporation	2,638,695	17	$3,250,695

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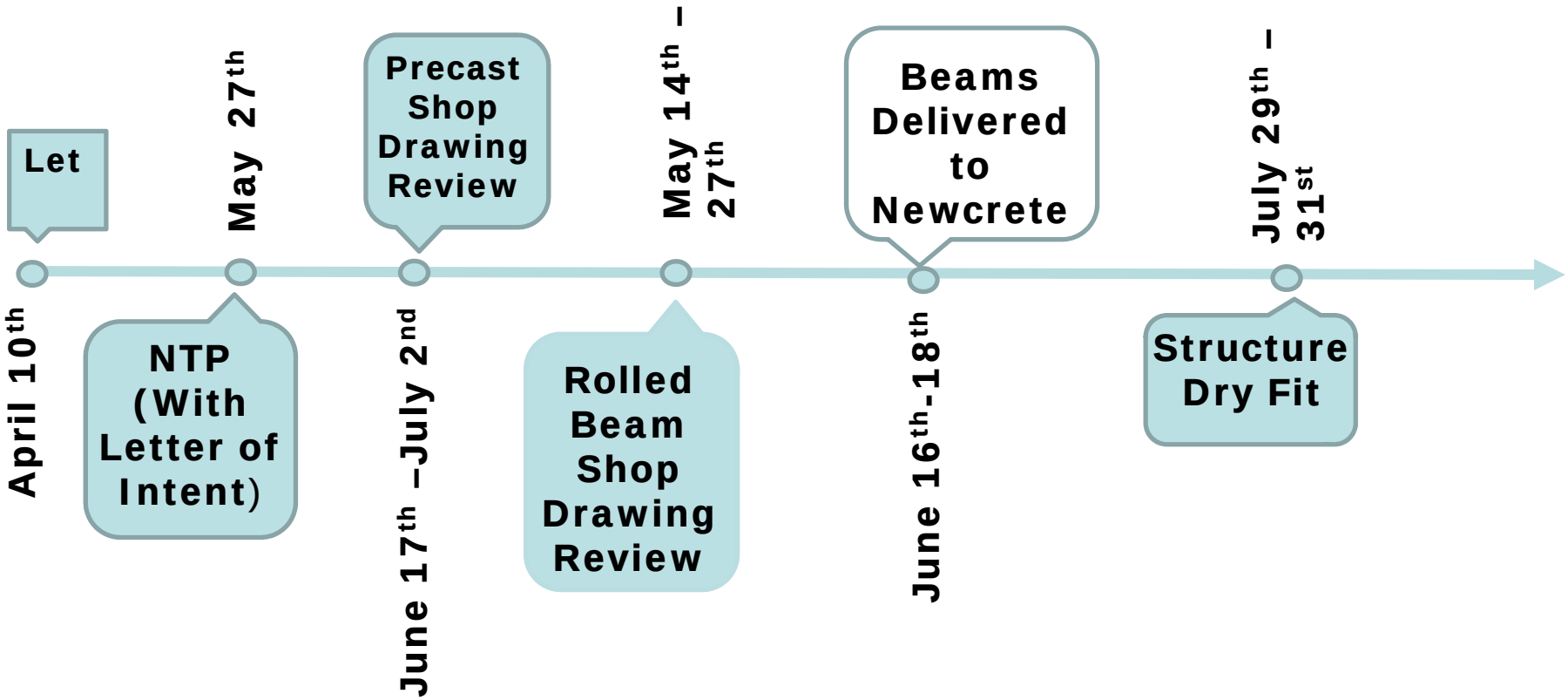
Project Timeline



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Project Goals

- Use ABC techniques~ duration of detour to be less than one month long
- Obtain competitive bids
- Ultra High Performance Concrete
- Integral Abutments

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Design Process

- PennDOT recently developed standards for ABC for substructures
- Researched other State's details and successful projects
- Researched FHWA's publications
- Presented multiple options to PennDOT
- Community was actively involved with the aesthetics of the bridge

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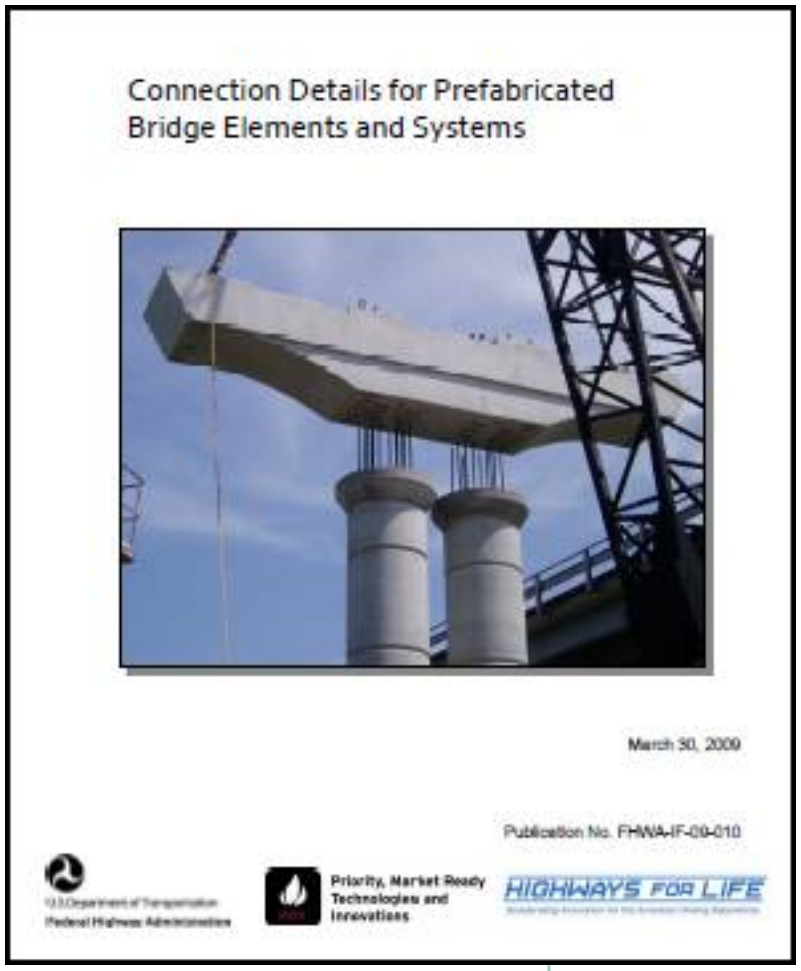
FHWA Connection Details



Publications available from FHWA
Contact Ben Beerman, P.E.

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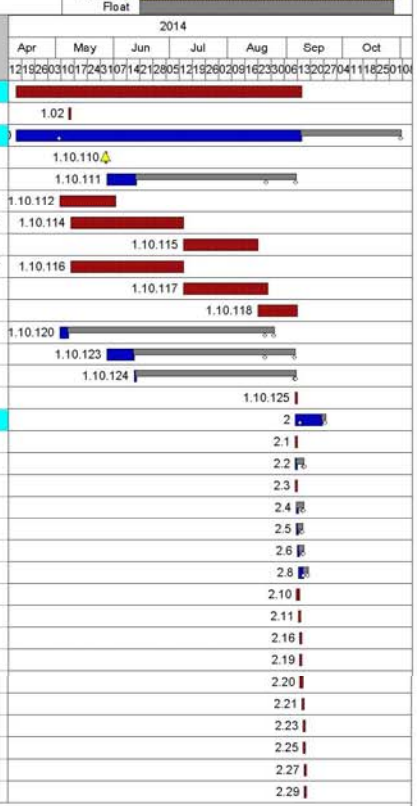
Construction Schedule

Anticipated NTP: 27May14
Anticipated Finish: 31Oct14
Run Date: 4March14
Created By: Nikki Bedillion

SR 0288 Section L10
Bridge Replacement
ECMS #90090
Pre-Bid Schedule

Activity ID	Activity Desc.	Duration	Total Float	Early Start	Early Finish	Late Start	Late Finish	Calendar ID
1	SR 288, Section L10 with a Letter of Intent	720h	0	04/10/14 08:00AM	09/08/14 04:00PM	04/10/14 08:00AM	10/31/14 04:00PM	Standard
1.02	Award of Project (anticipate 4 weeks)	224h	0	05/08/14 08:00AM	05/08/14 04:00PM	05/08/14 08:00AM	05/08/14 04:00PM	Calendar Day
1.10	NTP and Mobilization	720h	136h	04/10/14 08:00AM	09/08/14 04:00PM	05/02/14 04:00PM	10/31/14 04:00PM	Standard
1.10.110	NTP (5/27/2014) (6 weeks from Let date)	336h	0	05/27/14 08:00AM	05/27/14 04:00PM	05/27/14 08:00AM	05/27/14 04:00PM	Calendar Day
1.10.111	RNA (APRAS)	128h	680h	05/28/14 08:00AM	06/12/14 04:00PM	08/21/14 08:00AM	09/05/14 04:00PM	Calendar Day
1.10.112	Gas Line Relocation (By Others)	240h	0	05/03/14 08:00AM	06/01/14 04:00PM	05/03/14 08:00AM	06/01/14 04:00PM	Calendar Day
1.10.114	Submittal/ Approval Fab. Steel Shop Dwgs (Start at Award with a Letter of Intent)	320h	0	05/09/14 08:00AM	07/07/14 04:00PM	05/09/14 08:00AM	07/07/14 04:00PM	PENNDOT 5-DAY
1.10.115	Fabrication of Structural Steel	320h	0	07/08/14 08:00AM	08/16/14 04:00PM	07/08/14 08:00AM	08/16/14 04:00PM	7-DAY
1.10.116	Submittal/Approval Precast Units (Start at Award with a Letter of Intent)	320h	0	05/09/14 08:00AM	07/07/14 04:00PM	05/09/14 08:00AM	07/07/14 04:00PM	PENNDOT 5-DAY
1.10.117	Fabrication of Precast Units	360h	0	07/08/14 08:00AM	08/21/14 04:00PM	07/08/14 08:00AM	08/21/14 04:00PM	7-DAY
1.10.118	Construction of Beam Modules	160h	0	08/17/14 08:00AM	09/06/14 04:00PM	08/17/14 08:00AM	09/06/14 04:00PM	7-DAY
1.10.120	Mobilize	40h	860h	05/03/14 08:00AM	05/07/14 04:00PM	08/20/14 12:00PM	08/25/14 12:00PM	7-DAY
1.10.123	Advance Notification Signage	120h	668h	05/28/14 08:00AM	06/11/14 04:00PM	08/20/14 12:00PM	09/05/14 12:00PM	7-DAY
1.10.124	Install Fence along CSX Property	4h	668h	06/12/14 08:00AM	06/12/14 12:00PM	09/05/14 12:00PM	09/05/14 04:00PM	7-DAY
1.10.125	Start detouring traffic (Friday at 9 pm)	2h	0	09/05/14 11:00PM	09/05/14 11:00PM	09/05/14 11:00PM	09/05/14 11:00PM	7-DAY
2	Construction while detour is in place	332h	50.98h	09/05/14 11:00PM	09/19/14 07:00PM	09/08/14 01:59AM	09/21/14 09:59PM	7X24
2.1	Install E&S Controls and RCE's	4h	50.98h	09/05/14 11:00PM	09/06/14 03:00AM	09/08/14 01:59AM	09/08/14 05:59AM	7X24
2.2	Clearing and Grubbing	8h	90.98h	09/06/14 03:00AM	09/06/14 11:00AM	09/09/14 09:59PM	09/10/14 05:59AM	7X24
2.3	Remove existing roadway	4h	50.98h	09/06/14 03:00AM	09/06/14 07:00AM	09/08/14 05:59AM	09/08/14 09:59AM	7X24
2.4	Drive Piles at Abutment 1	12h	82.98h	09/06/14 07:00AM	09/06/14 07:00PM	09/09/14 05:59PM	09/10/14 05:59AM	7X24
2.5	Predill at Abutment 2 if necessary	24h	58.98h	09/06/14 07:00AM	09/07/14 07:00AM	09/08/14 05:59PM	09/09/14 05:59PM	7X24
2.6	Drive piles at Abutment 2 (assume two pile drivers)	12h	58.98h	09/07/14 07:00AM	09/07/14 07:00PM	09/09/14 05:59PM	09/10/14 05:59AM	7X24
2.8	Restrike Piles (wait 48 hours after piles driven to refusal)	56h	58.98h	09/07/14 07:00PM	09/10/14 03:00AM	09/10/14 05:59AM	09/12/14 01:59PM	7X24
2.10	Remove existing structure	36h	50.98h	09/06/14 07:00AM	09/07/14 07:00PM	09/08/14 09:59AM	09/09/14 09:59PM	7X24
2.11	Install Cofferdam	8h	50.98h	09/07/14 07:00PM	09/08/14 03:00AM	09/09/14 09:59PM	09/10/14 05:59AM	7X24
2.16	Excavation for abutments and wingwalls	8h	50.98h	09/08/14 03:00AM	09/08/14 11:00AM	09/10/14 05:59AM	09/10/14 01:59PM	7X24
2.19	Installation of drainage off roadway components (endwall, outlet pipes, etc.)	8h	50.98h	09/08/14 11:00AM	09/08/14 07:00PM	09/10/14 01:59PM	09/10/14 09:59PM	7X24
2.20	Place R-8/R-4 rock	36h	50.98h	09/08/14 07:00PM	09/10/14 07:00AM	09/10/14 09:59PM	09/12/14 09:59AM	7X24
2.21	Remove cofferdam	4h	50.98h	09/10/14 07:00AM	09/10/14 11:00AM	09/12/14 09:59AM	09/12/14 01:59PM	7X24
2.23	Set up 550 T crane and one additional crane	8h	50.98h	09/10/14 11:00AM	09/10/14 07:00PM	09/12/14 01:59PM	09/12/14 09:59PM	7X24
2.25	Install precast integral abutment pile caps	8h	50.98h	09/10/14 07:00PM	09/11/14 03:00AM	09/12/14 09:59PM	09/13/14 05:59AM	7X24
2.27	Fill voids in corrugated pipes with grout	4h	50.98h	09/11/14 03:00AM	09/11/14 07:00AM	09/13/14 05:59AM	09/13/14 09:59AM	7X24
2.29	Cure time for Grout (8 hours)	8h	50.98h	09/11/14 07:00AM	09/11/14 03:00PM	09/13/14 09:59AM	09/13/14 05:59PM	7X24



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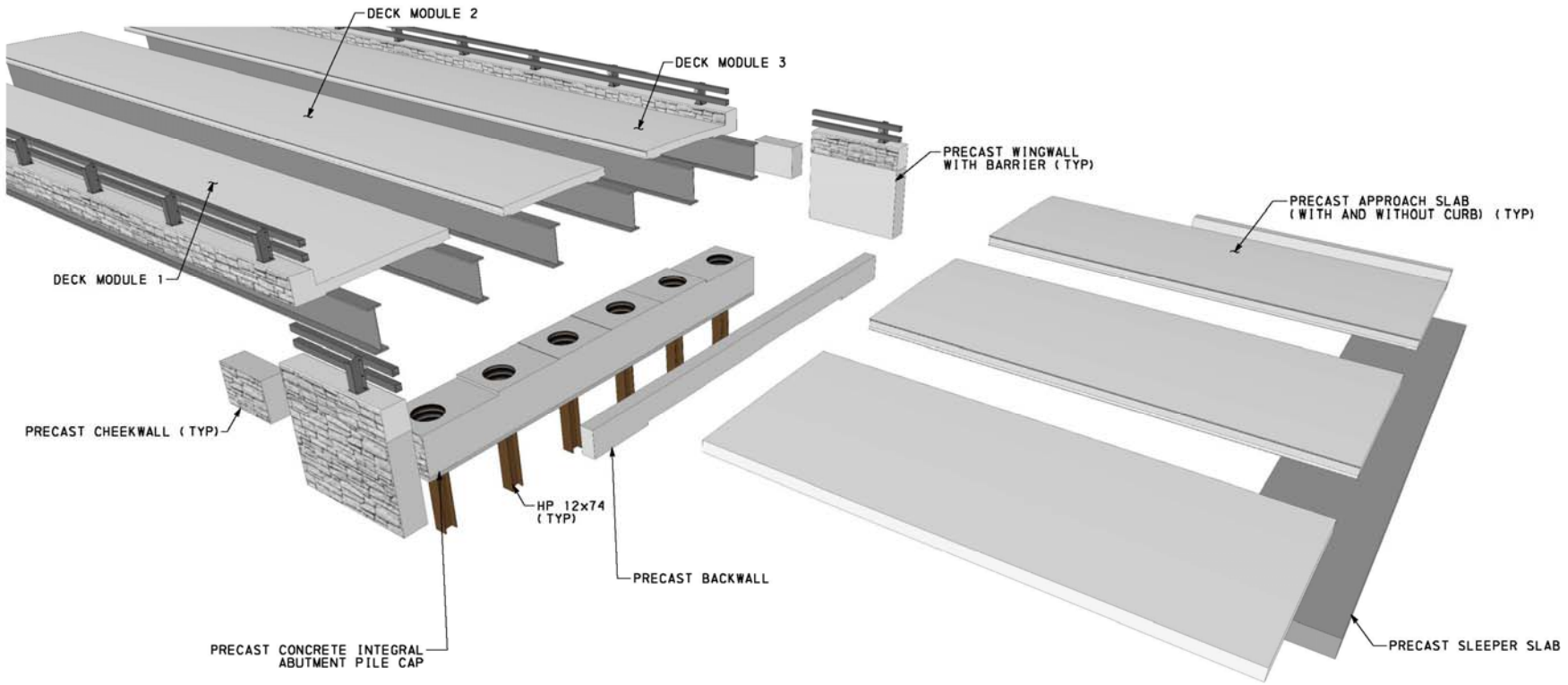
Prefabricated/ Precast Structure



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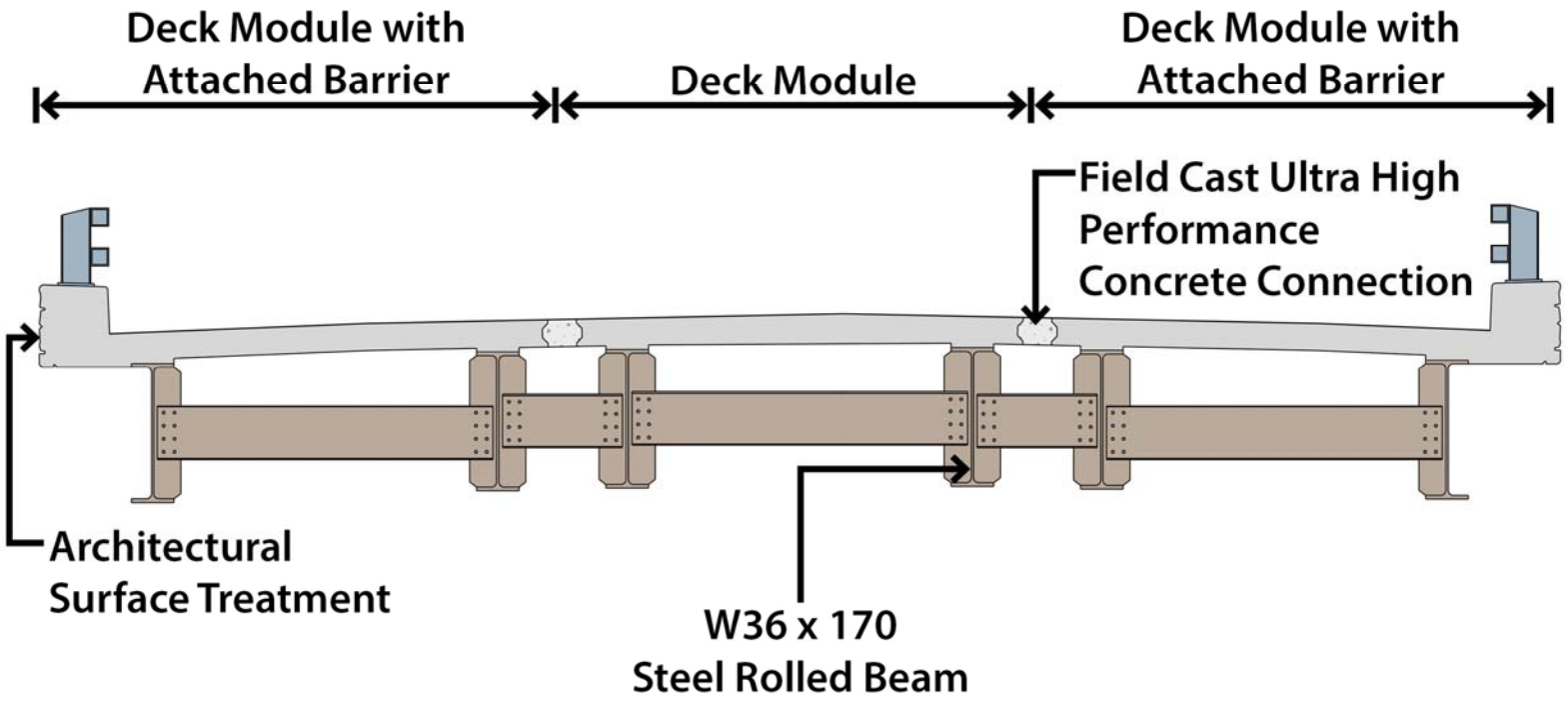
Typical Section



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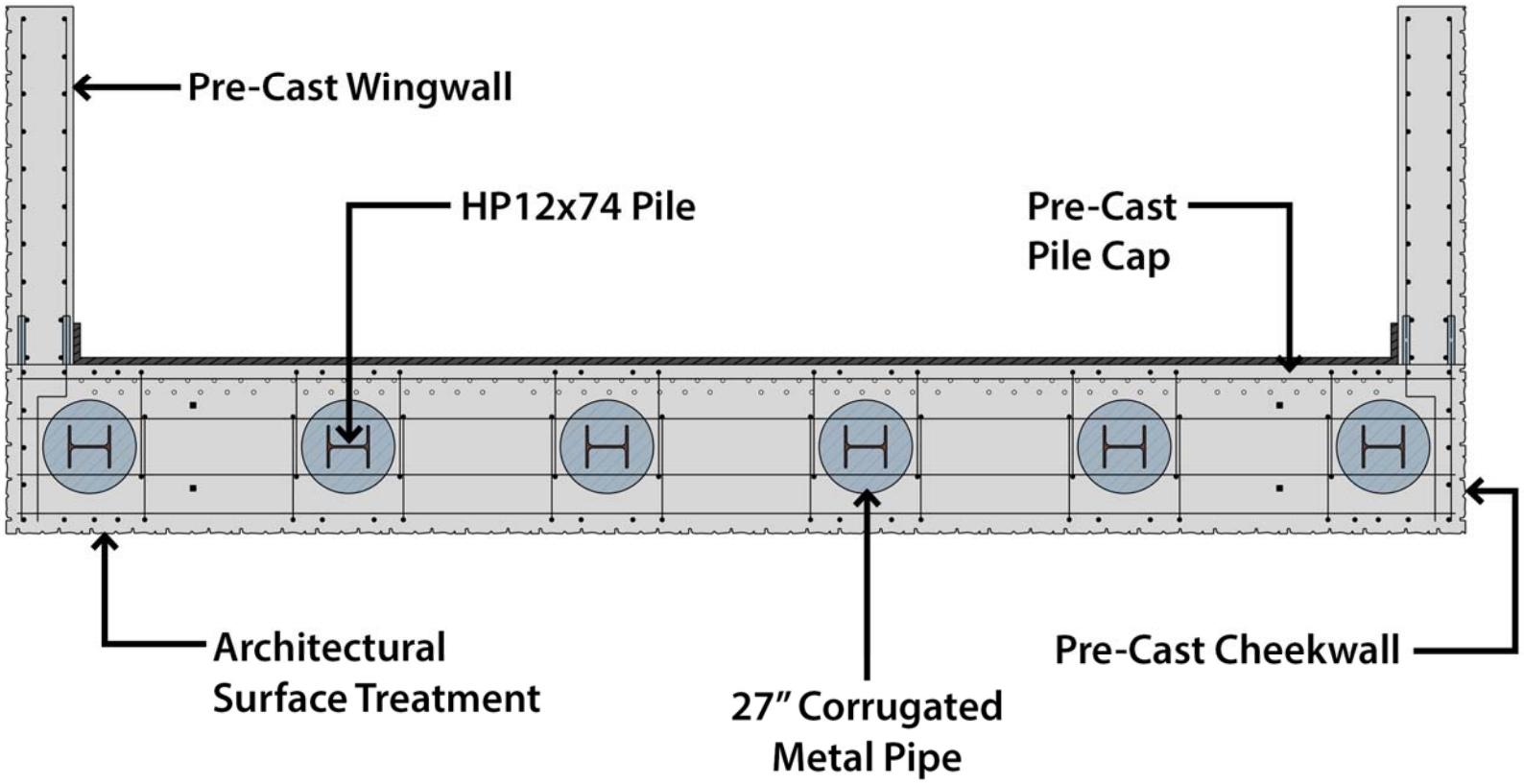
Precast Abutment and Wingwalls



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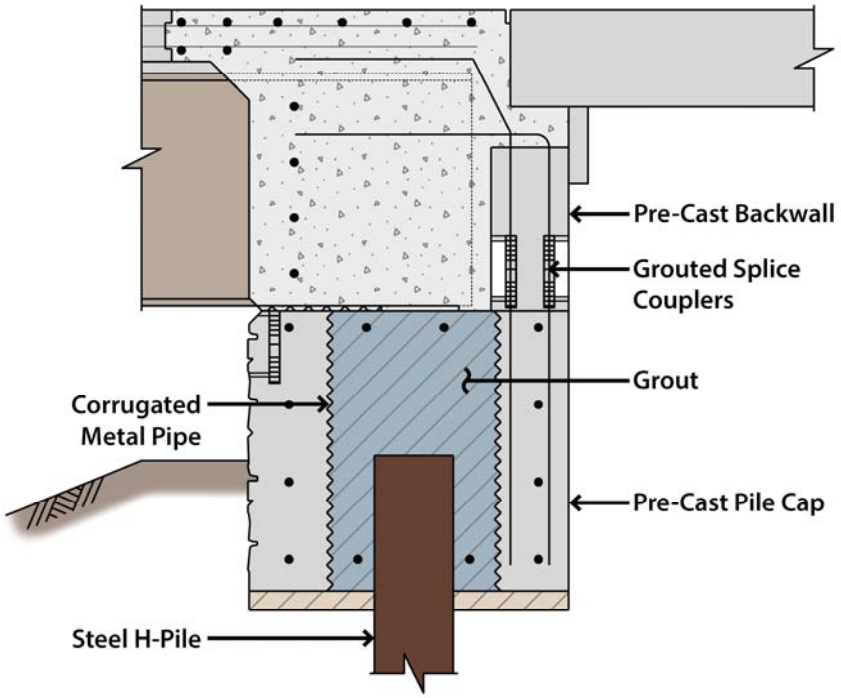
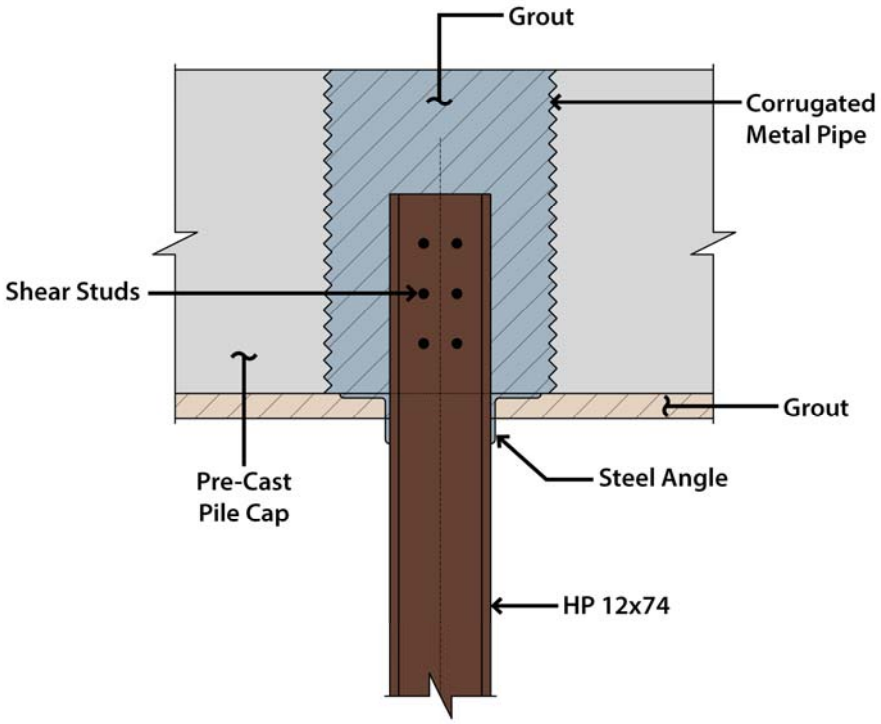
Abutment Section





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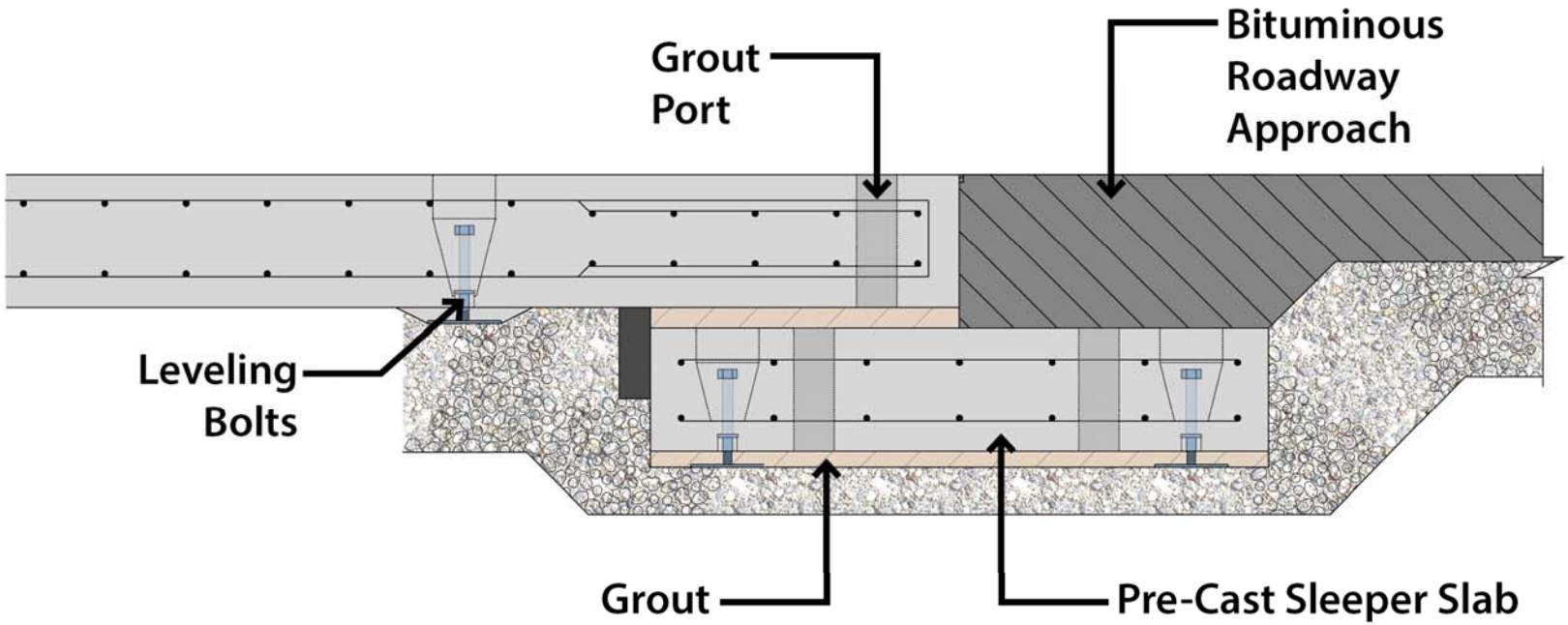
Precast Sleeper Slab and Approach Slabs



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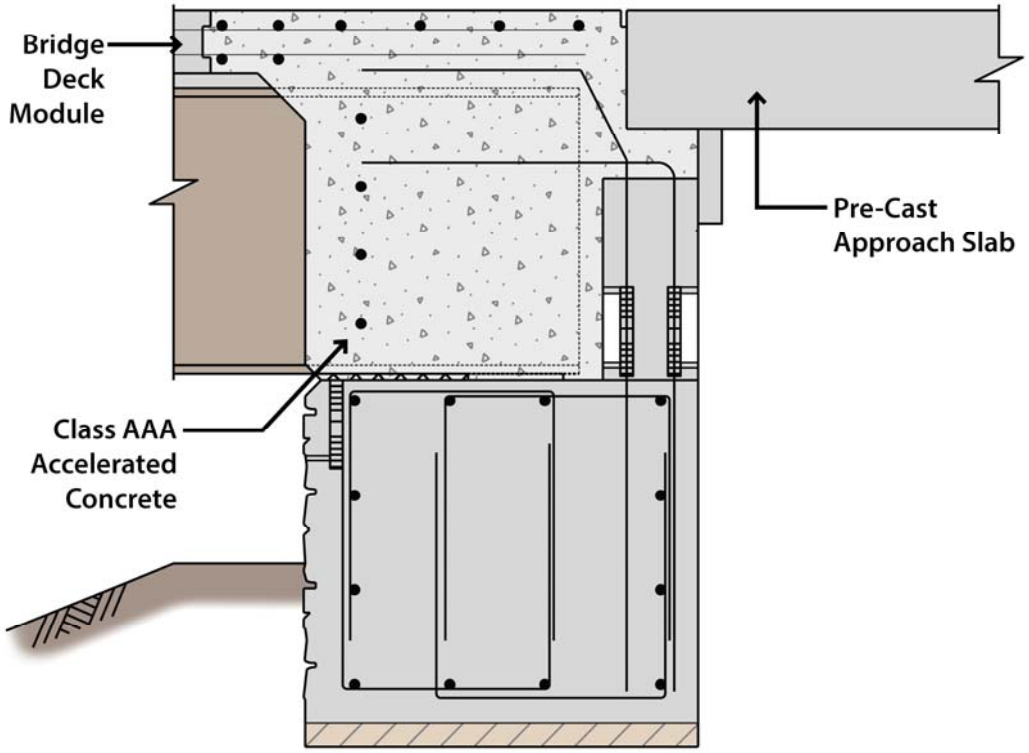
Closure Pour at Integral Abutment



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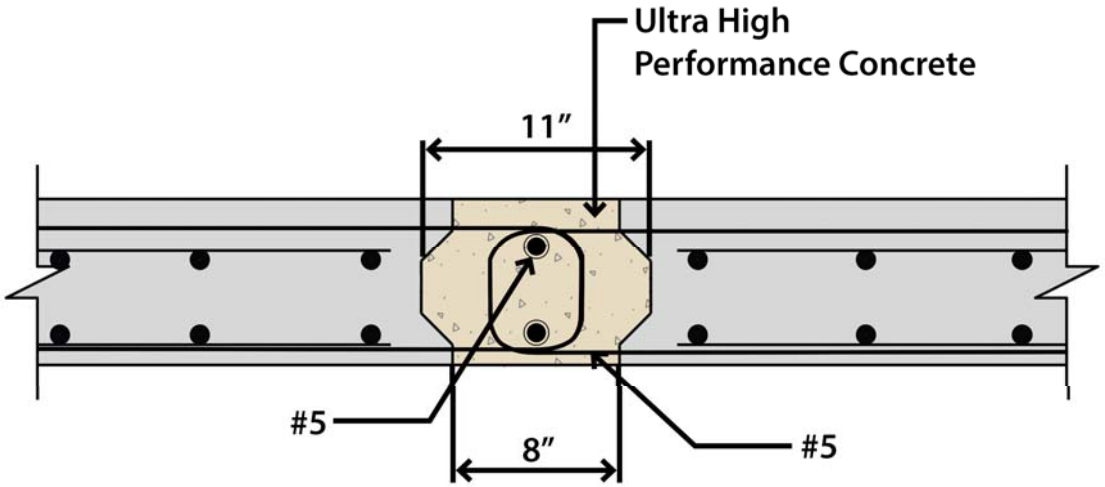
Ultra High Performance Concrete Joints



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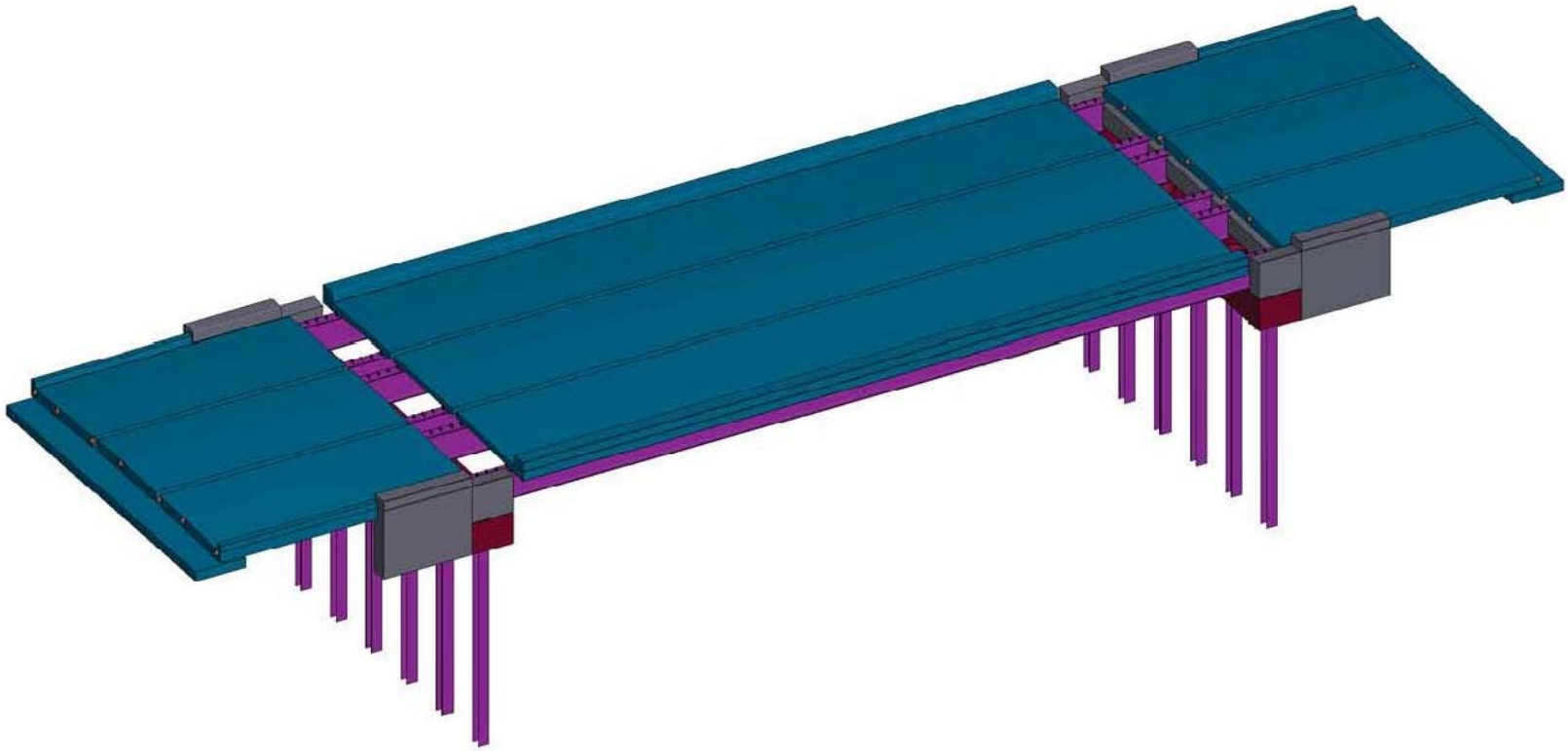
SR 288-L10 3-D Model



3-D Model prepared by Newcrete

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SR 288-L10 Fabrication Shop Photos

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SR 288-L10 – Work done prior to closure

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SR 288-L10 –Work done prior to closure

Time Lapse Video Camera

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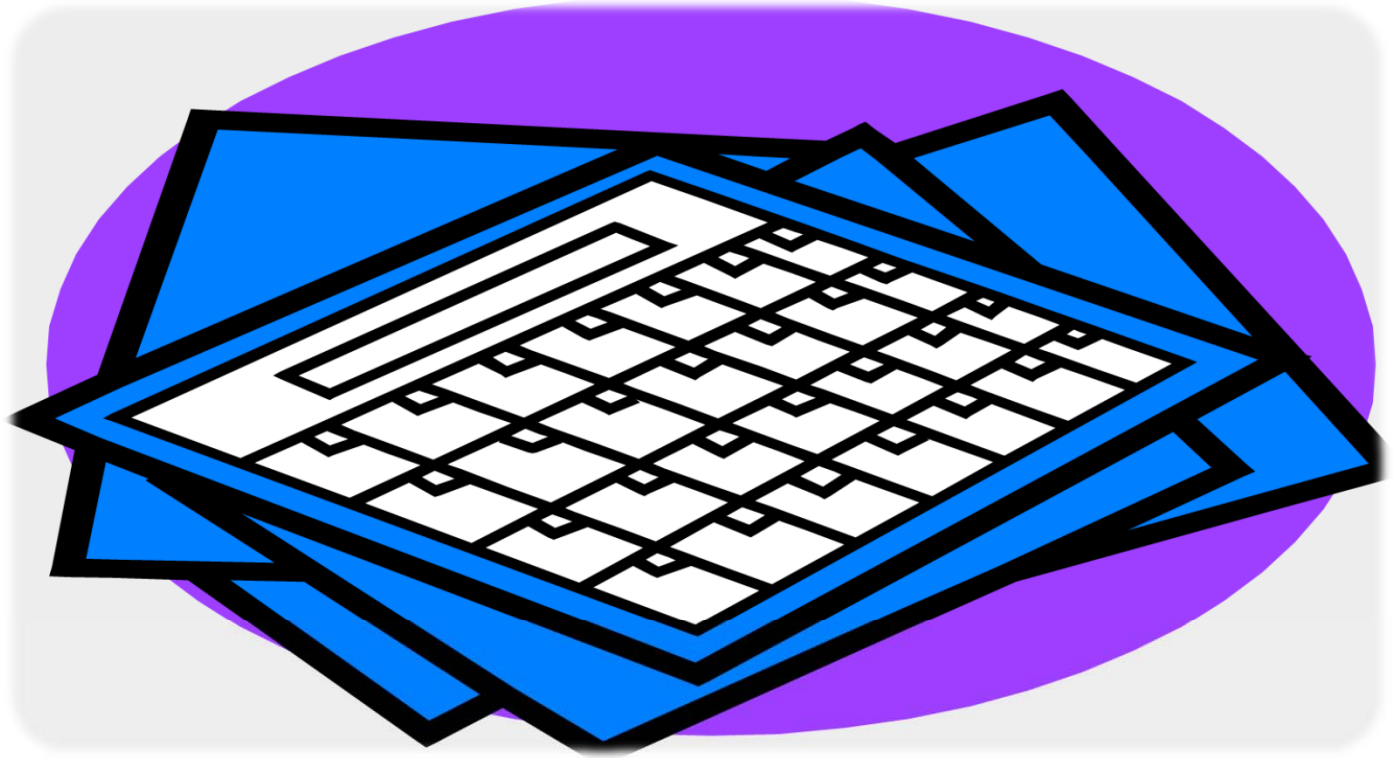
SR 288-L10

Day 1



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SR 288-L10 – Day 1 Monday 8/18/2014

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SR 288-L10 – Day 1 Monday 8/18/2014 Continued

Piles were Located to Avoid the Existing Arch

Cut Piles

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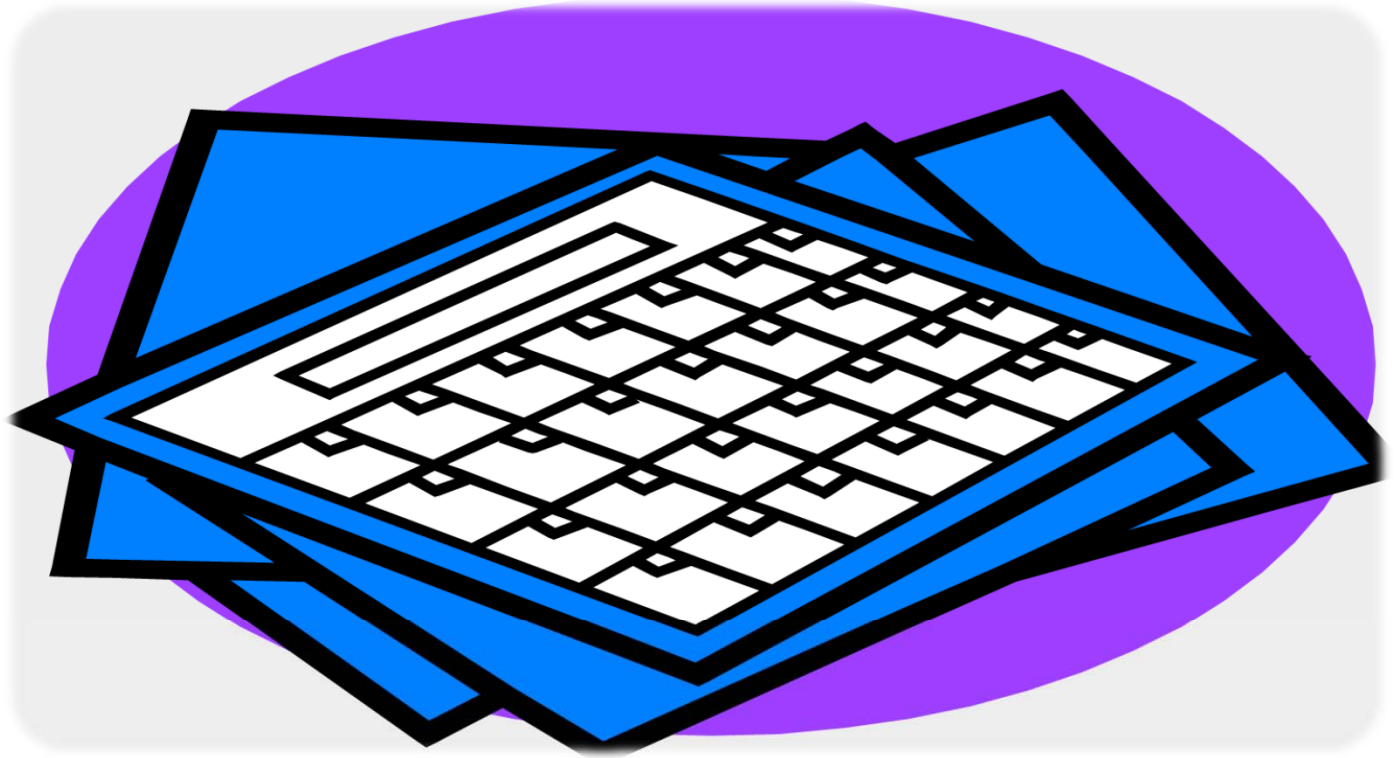
Day 2



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SR 288-L10 Day 2 Tuesday 8/19/2014

Welding Angles on Piles

Slope Protection in Front of Integral Abutments

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SR 288-L10 – Day 2 Tuesday 8/19/2014 Continued

3 cranes were used: 550 Ton, 222 Ton & 100 Ton

Took 3 Shifts to Set Up Crane (Delivered on 9 Trucks)

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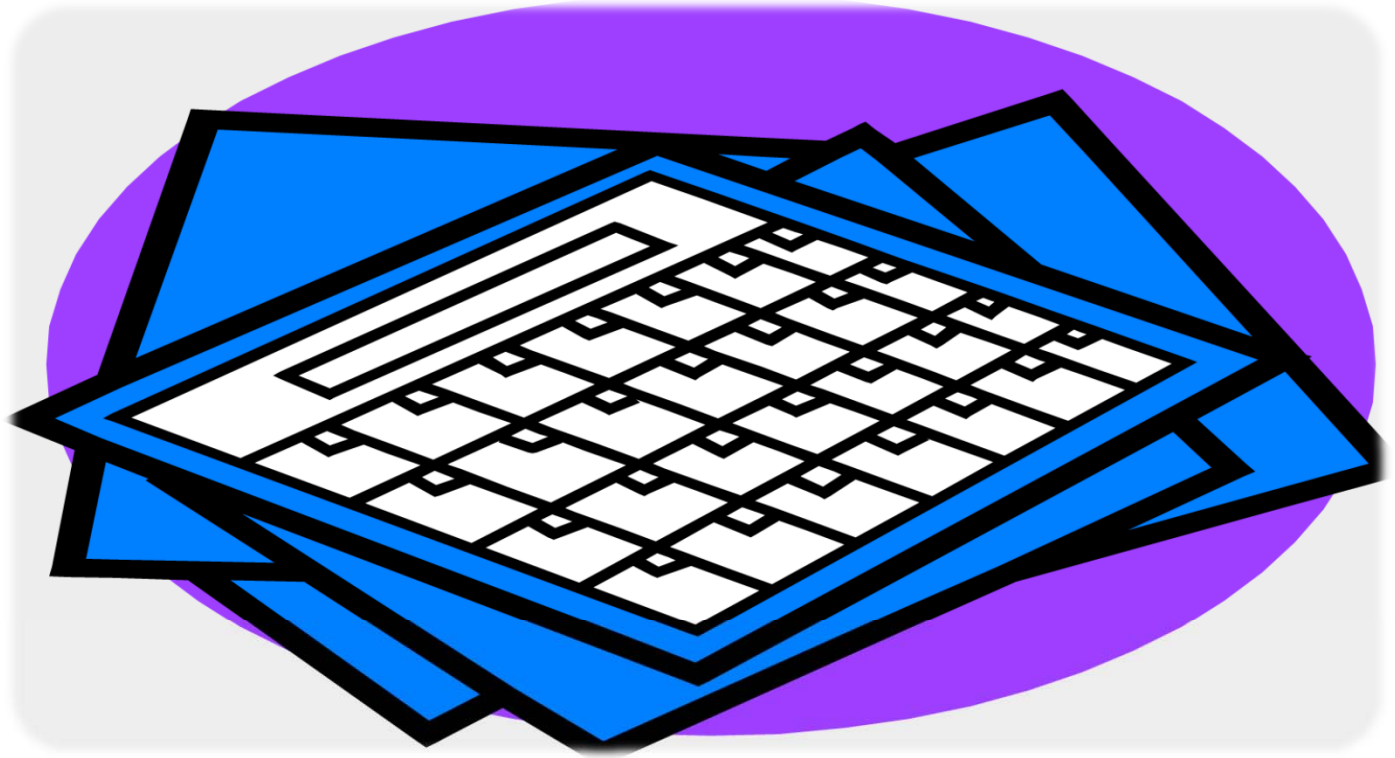
Day 3



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SR 288-L10 Day 3 Wednesday 8/20/2014

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SR 288-L10 Day 3 Wednesday 8/20/2014 Continued

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SR 288-L10 Day 3 Wednesday 8/20/2014 Continued

Deck Modules were Set in 3 Hours

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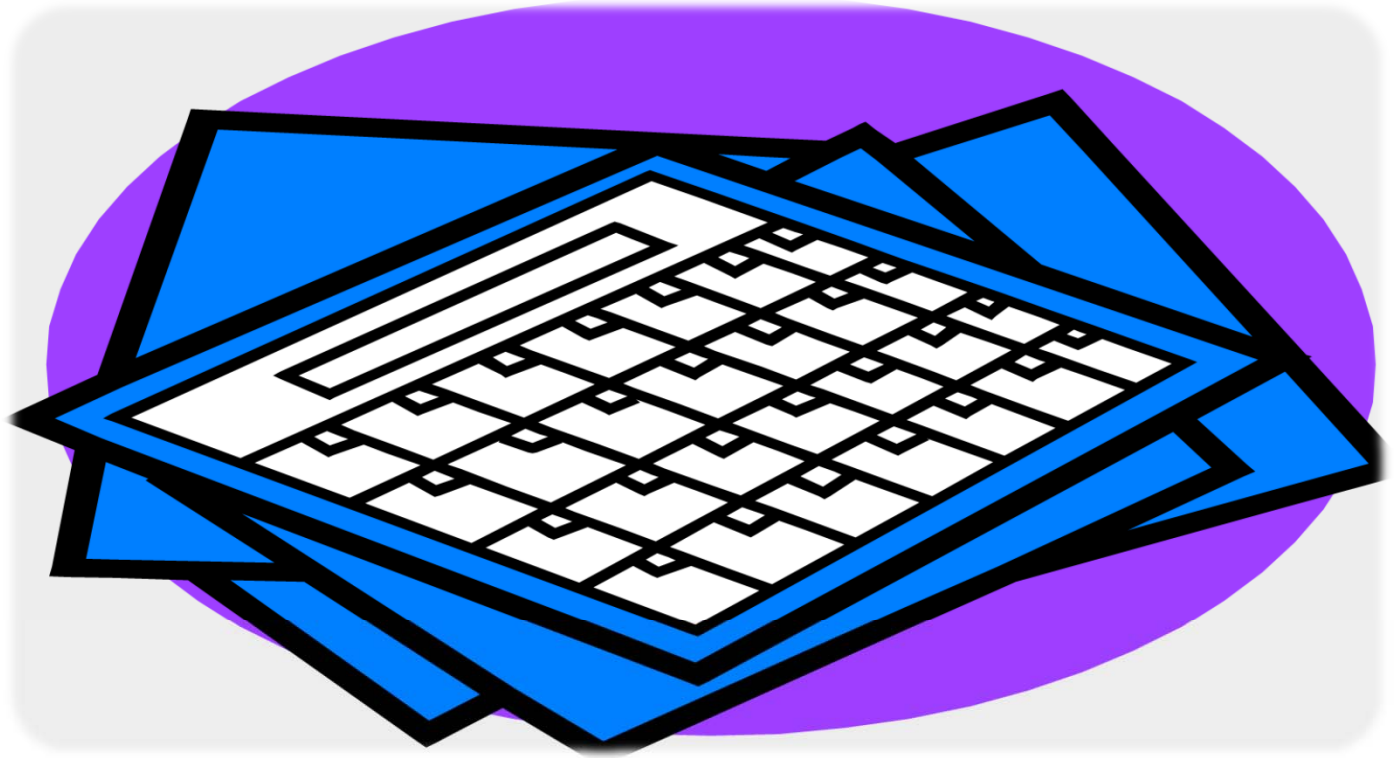
Day 4



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SR 288-L10 Day 4 Thursday 8/21/2014

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SR 288-L10 Day 4 Thursday 8/21/2014 Continued

Sleeper Slab Sub-base

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SR 288-L10 Day 4 Thursday 8/21/2014 Continued

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SR 288-L10 Day 4 Thursday 8/21/2014 Continued

View looking Up Underneath Deck

Polyethylene Sheeting to allow Approach slab to Slide over Sub-base

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SR 288-L10 Day 4 Thursday 8/21/2014 Continued

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Closure Pour at Integral Abutment to Approach Slab

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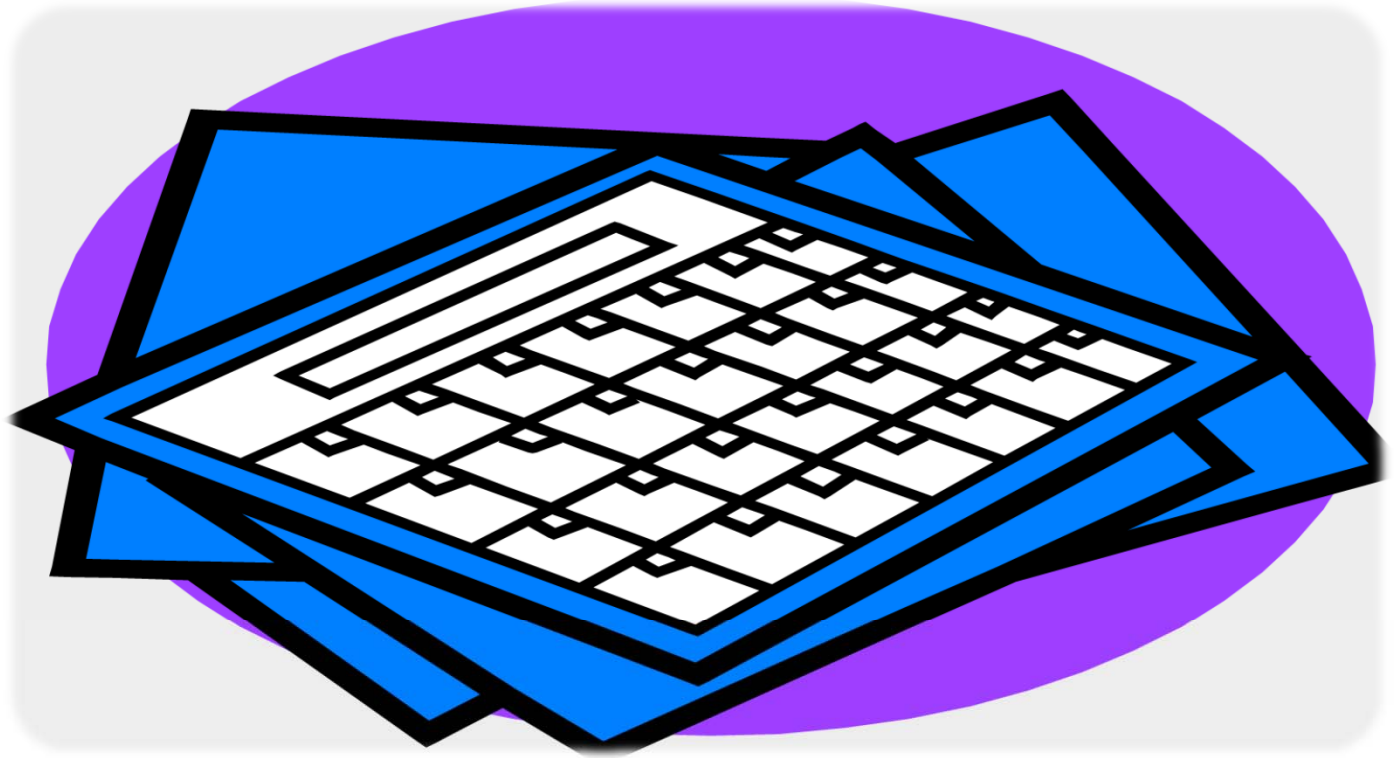
SR 288-L10

Day 5



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SR 288-L10 – Day 5 Friday 8/22/2014

Placement of Approach Slab at Abutment 1

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Abutment 1 Approach Slab

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View Looking at Abutment 2

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Closure pour Abutment 1

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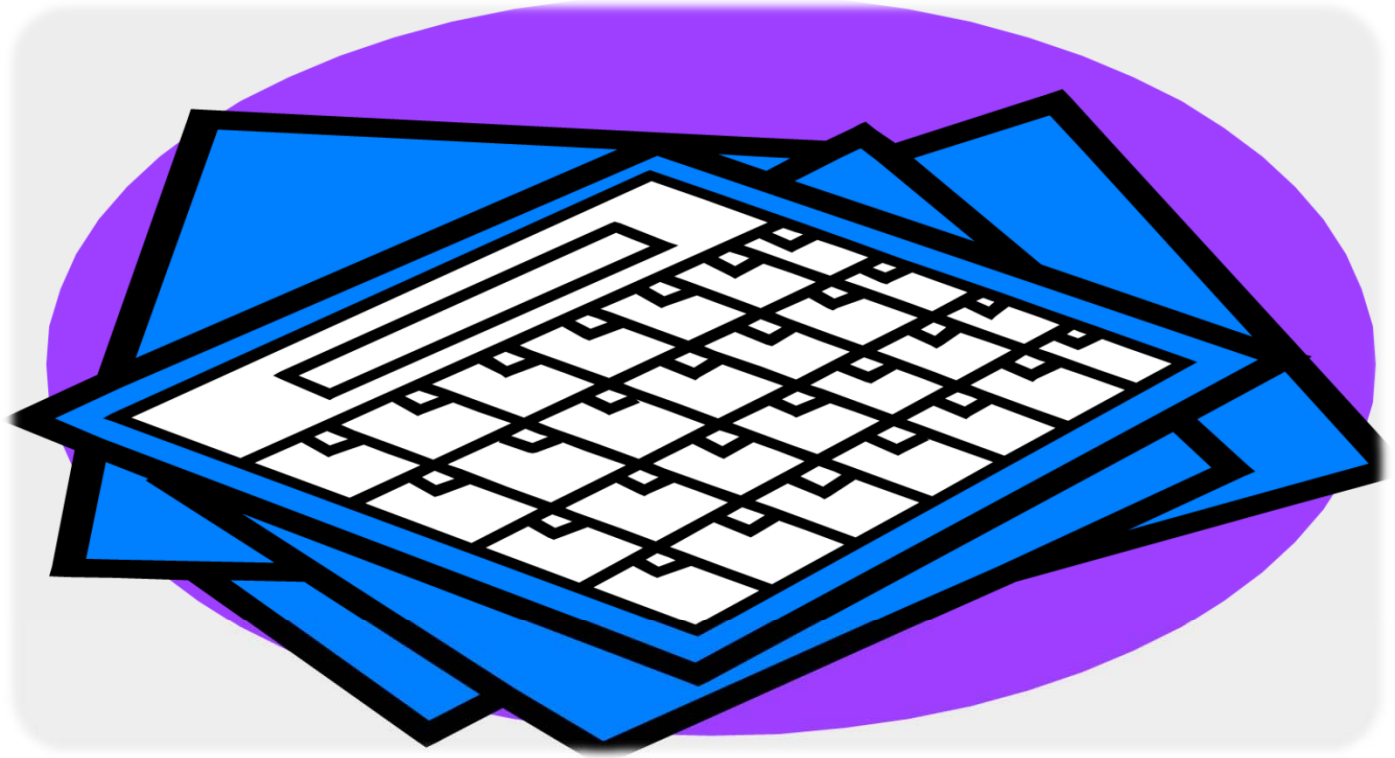
SR 288-L10

Day 6



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SR 288-L10 – Day 6 Saturday 8/23/2014

Lead Inspector – Top Cat

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SR 288-L10 – Day 6 Saturday 8/23/2014 Continued

UHPC Joints

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UHPC Concrete

Add Mixtures and Ice

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Steel Fibers

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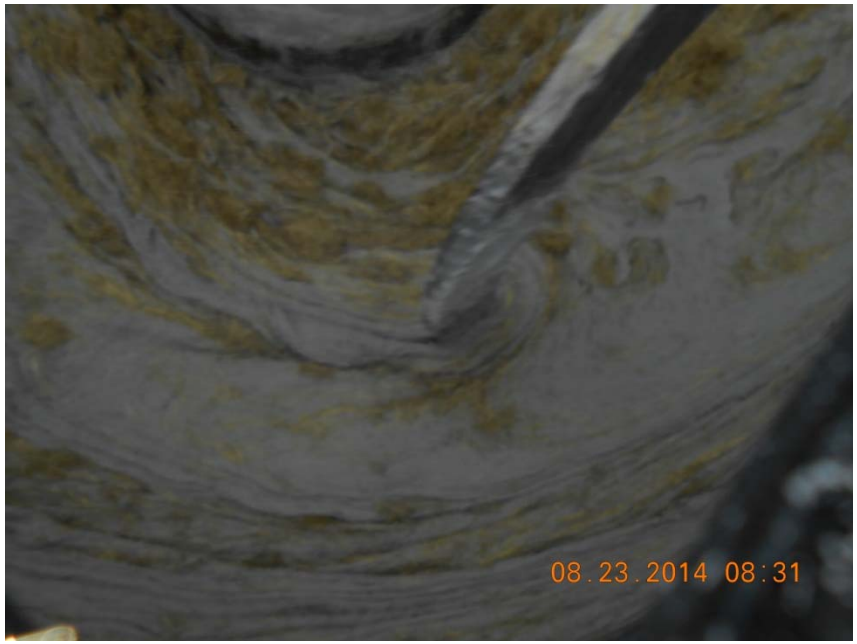
SR 288-L10 Day 6 Saturday 8/23/2014 Continued

View Looking Into Mixer



Dispensing UHPC from Mixer to Buggies

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Temperature Check

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Segregation Check

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UHPC Pour

Fiber Board

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MDF(Medium Density Fiberboard)

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Leak Being Plugged with Stone

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SR 288-L10 Day 6 Saturday 8/23/2014 UHPC Joints Continued

Chimney Used to Fill Voids

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UPHC Cores

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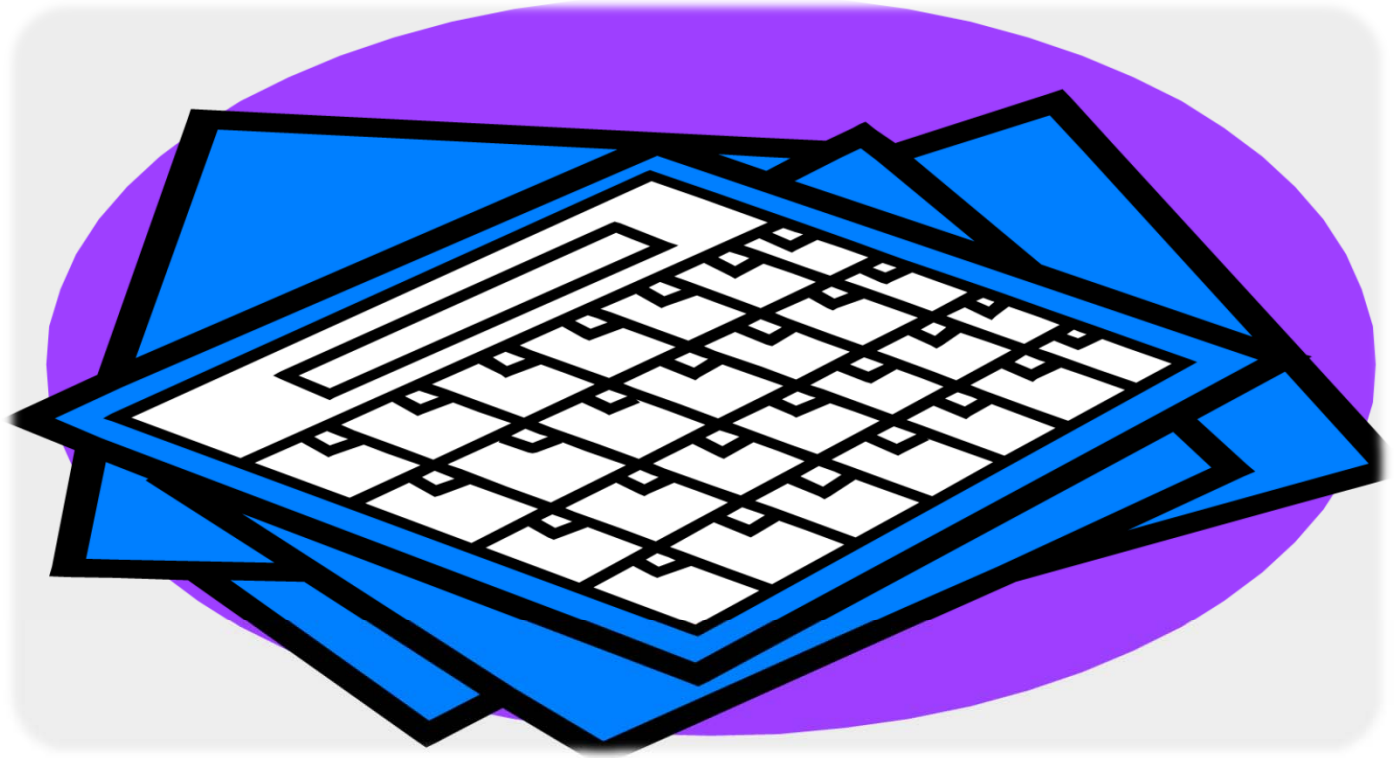
SR 288-L10

Day 7



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SR 288-L10 Day 6 Saturday 8/23/2014 and Day 7 Sunday 8/24/2014

BRIDGE RAIL and GUIDE RAIL PLACEMENT

Day 6

Day 7

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SR 288-L10 Day 7 Sunday 8/24/2014 Continued

APPROACH PAVING

UHPC JOINT

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SR 288-L10 Opened to Traffic on 8/24/2014 at 10:30pm to Traffic

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SR 288- L10 September 27th & 28th

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Conclusions

- Very successful project done in less than 7 days for $640/*sf(bid amount)*, about $200,000 more than a normal job, but well within $800/*sf,* average in our district.
- The bridge cost is $1,299,070/(78x35.25) = $472/*sf*
- Lessons Learned: Pour approach slabs to save on crane rental; Use plexi-glass to cover UHPC joints to see voids in the joints
- Community was very happy with the project

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Thank You

- Project involved cooperation from owner to designer to contractor in order for it to be successful
- Thank you to PennDOT
  - Scott Christie, Deputy Secretary of Highway Administration
  - H. Daniel Cessna, District Executive
  - Cheryl Moon Sirianni, Assistant District Executive, Design
  - Tom Macioce, Division Chief-Bridge Design and Technology Division
  - Jim Foringer, Assistant District Executive, Construction
  - Mike McCart, Assistant Construction Engineer
  - Dave Raybuck, Construction Inspection Supervisor

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Thank You

- Thank you to JMT, Designer
- Thank you to Joseph B. Fay, Contractor
  - Tyson Hicks, Project Manager
  - Dennis Watkins, Vice President
  - Jack Yon, Project Superintendent
  - Michelle Olszewski,Project Engineer
- Thank you to Newcrete, Pre-Fabricator
  - Russell Dickson, Engineering Manager

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Questions?