ACCELERATED BRIDGE CONSTRUCTION (ABC)

LOUISIANA

LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

By: Mark Bucci, P.E.
LADOTD Bridge Design

Our Experience with ABC

- Prefabricated Elements
- Prefabricated Systems
- Accelerated Construction Methods
- Proposed Project using ABC

Prefabricated Elements

- Mostly a Concrete State

- Precast Prestressed Concrete Girders & Piling
  - Used extensively
  - Several producers around the State
  - Competitive pricing

Prefabricated Elements

- Precast Reinforced Concrete Decks
  - Limited use
  - Typically reserved for time critical projects
- Precast Reinforced Concrete Bents
  - Limited use
  - Lends itself well to repetitive type construction

Prefabricated Elements

- Precast Concrete Elements
  - Girders

Prefabricated Elements

- Precast Concrete Elements
  - Girders
  - Piling

Prefabricated Elements

- Precast Concrete Elements
  - Girders
  - Piling

Prefabricated Elements

- Precast Concrete Elements
  - Girders
  - Piling
  - Decks

Prefabricated Elements

- Precast Concrete Elements
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  - Piling
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Prefabricated Elements

- Precast Concrete Elements
  - Girders
  - Piling
  - Decks
  - Bents

Our Experience with ABC

- Prefabricated Elements
- Prefabricated Systems
- Accelerated Construction Methods
- Proposed Project using ABC

Prefabricated Systems

- Prefabricated Spans
  - Limited use
  - New Construction
    - Large projects with repetitive construction
    - Typically reserved for time critical projects
  - Repairs
    - Span replacement

Prefabricated Systems

- New Construction – Large Projects

Prefabricated Systems

- Span Replacement - Repairs

Prefabricated Systems

- Span Replacement - Repairs

Our Experience with ABC

- Prefabricated Elements
- Prefabricated Systems
- Accelerated Construction Methods
- Proposed Project using ABC

Accelerated Construction Methods

- Structural Placement Methods
  - Typically reserved for time critical projects
  - Set maximum closure period in plans
  - Suggest method to establish feasibility

- Construction Method
  - Geosynthetic Reinforced Soil Integrated Bridge System (GRS-IBS)

Accelerated Construction Methods

- Structural Placement Methods
  - Crane

Accelerated Construction Methods

- Structural Placement Methods
  - Crane

Accelerated Construction Methods

- Structural Placement Methods
  - Crane

Accelerated Construction Methods

- Structural Placement Methods
  - Crane
  - SPMT

Accelerated Construction Methods

- Structural Placement Methods
  - Crane
  - SPMT

Accelerated Construction Methods

- Structural Placement Methods
  - Crane
  - SPMT

Accelerated Construction Methods

- Construction Methods
  - GRS-IBS

PROPOSED PROJECT

US 165 BRIDGES NEAR FENTON

PRECAST SLAB SPAN BRIDGE

LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

By: Andrew Michael, P.E.
LADOTD Bridge Design

Project Information

- Current letting: 12/09/2015
- Pilot project to develop Precast Slab Span Bridge Special Details
- Plans expedited to meet federal authorization deadline

Site Information

- Site Location

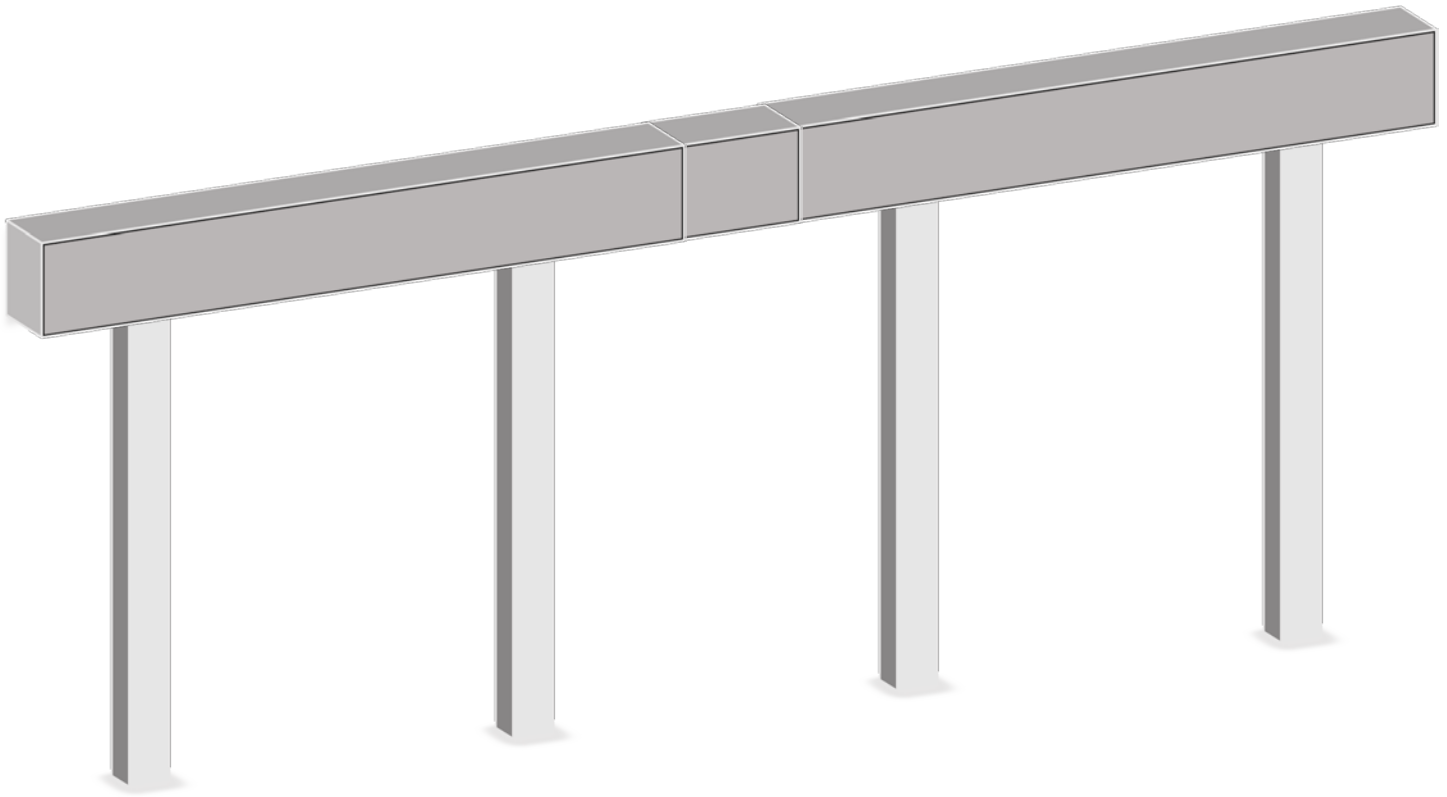
Site Information

- Site Location

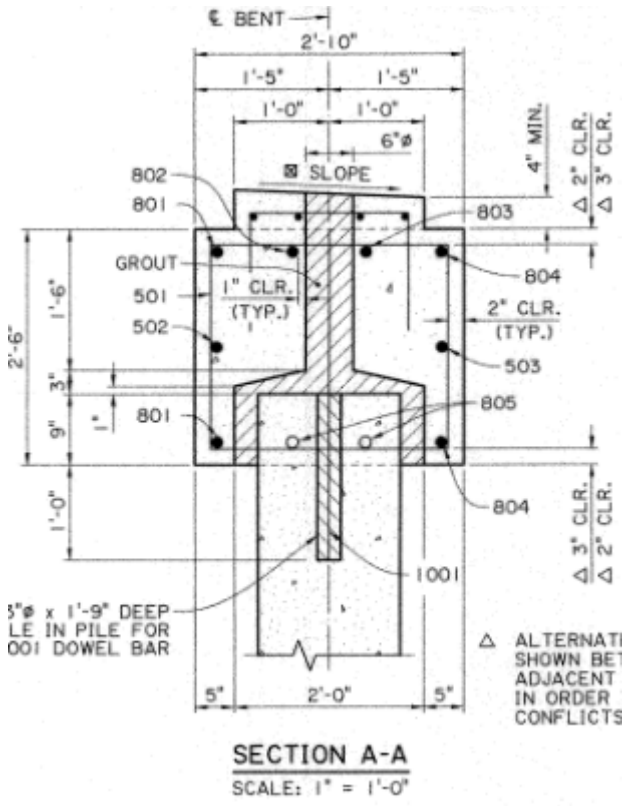
General Design Requirements

- Live load
  - Louisiana Design Vehicle Live Load (LADV-11)
- Precast members minimum strength
  - Cap, Span and approach slab members: f’c = 6000 psi
  - Piles: f’c = 4500 psi
- Precast member fabrication tolerances
  - Unit Depth ± 3/16 inch
  - Unit Length +1/8 inch and -1/2 inch
  - Overall span width ± 1/8 inch
  - Riser flatness ± 1/8 inch per 10 ft

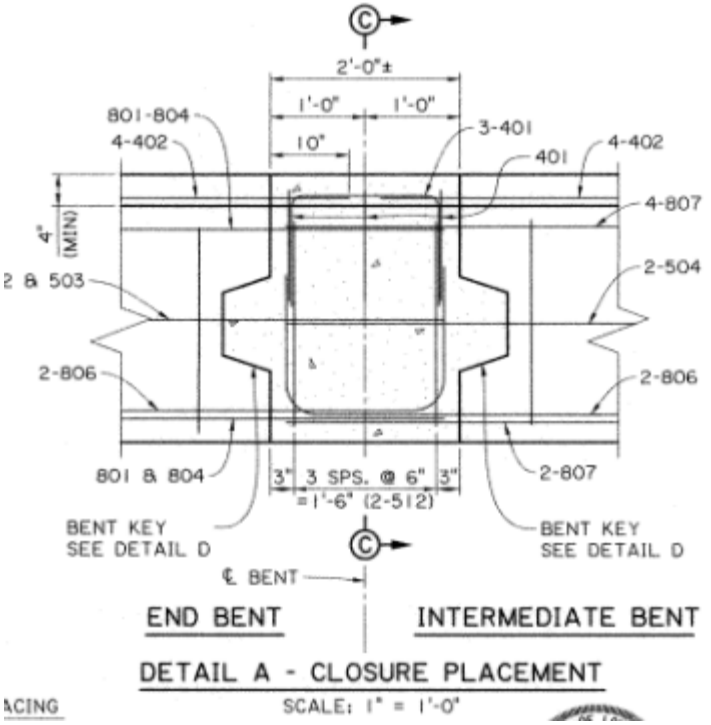
Substructure Construction Sequence

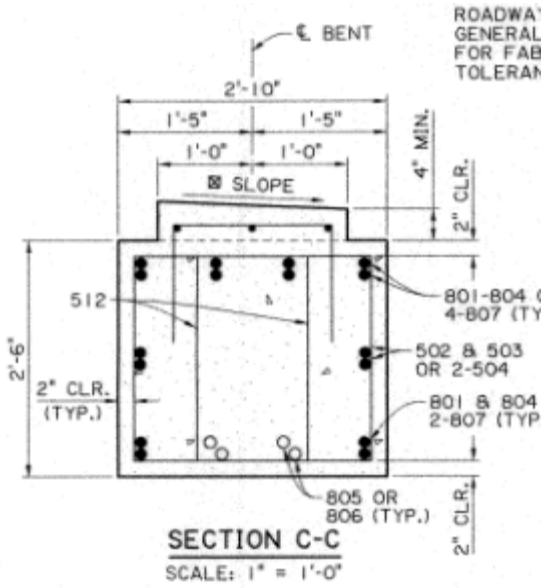


Pile and Cap Section

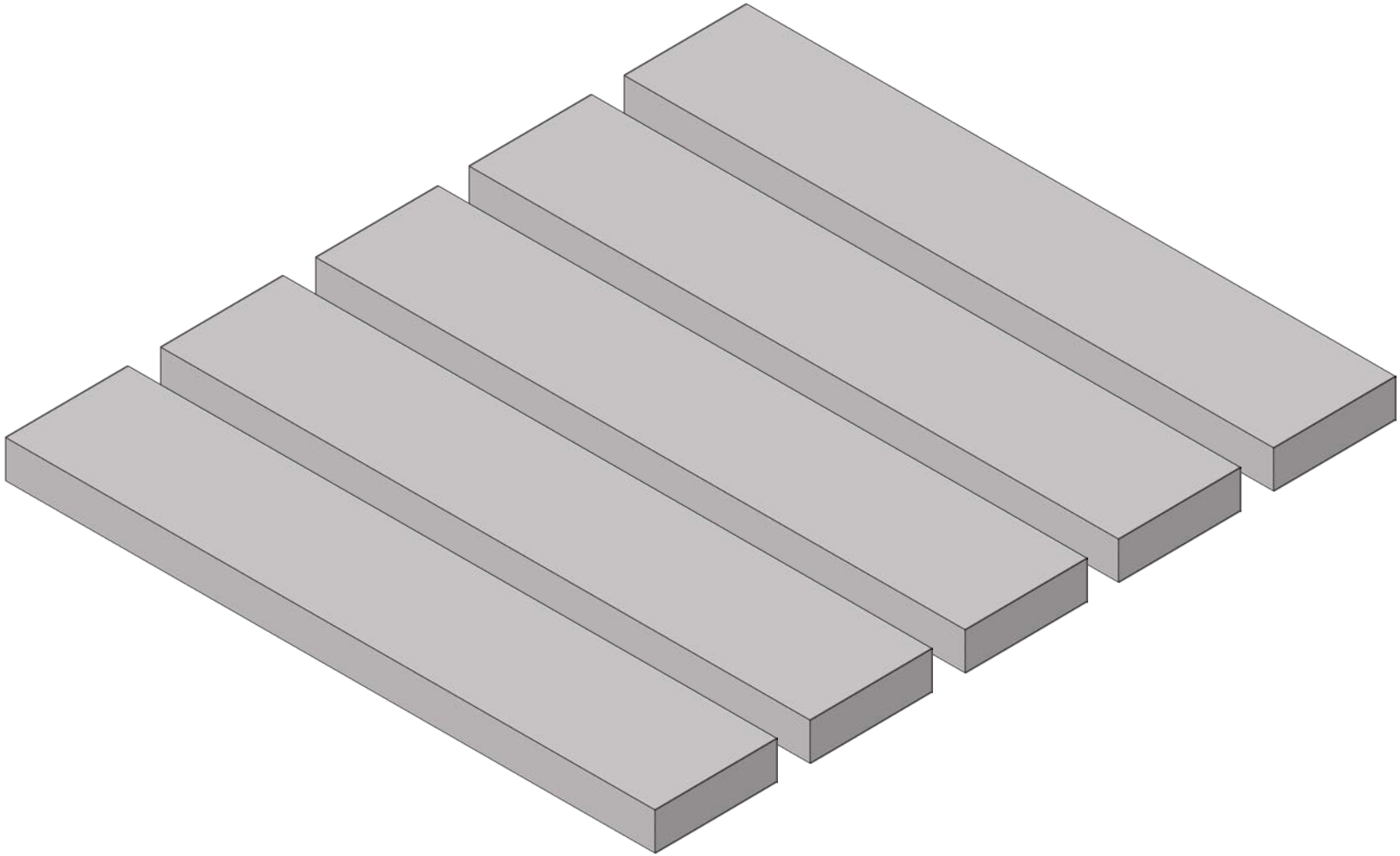


Cap Closure Placement

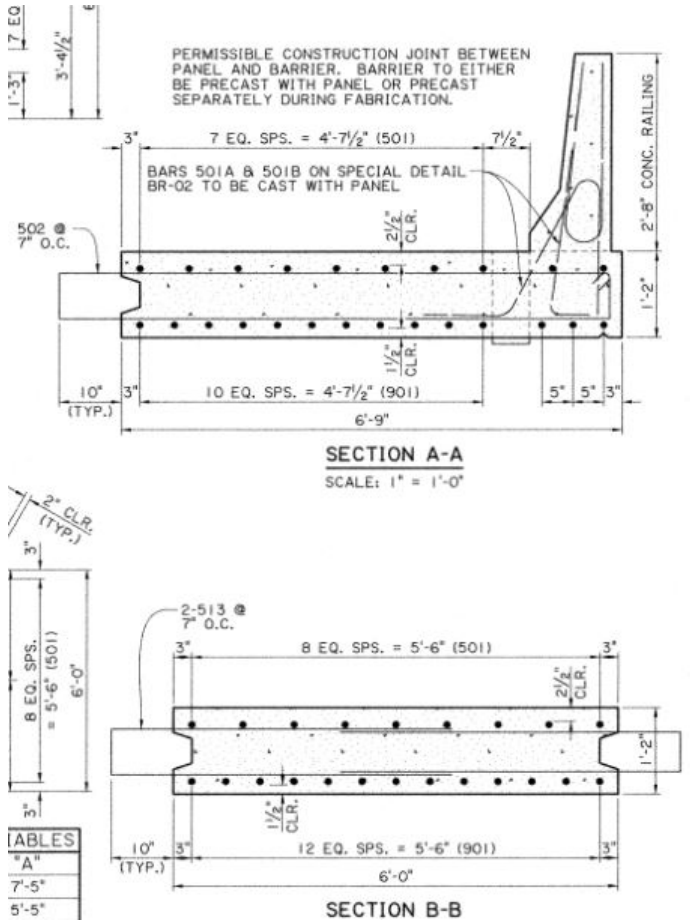




Superstructure Construction Sequence

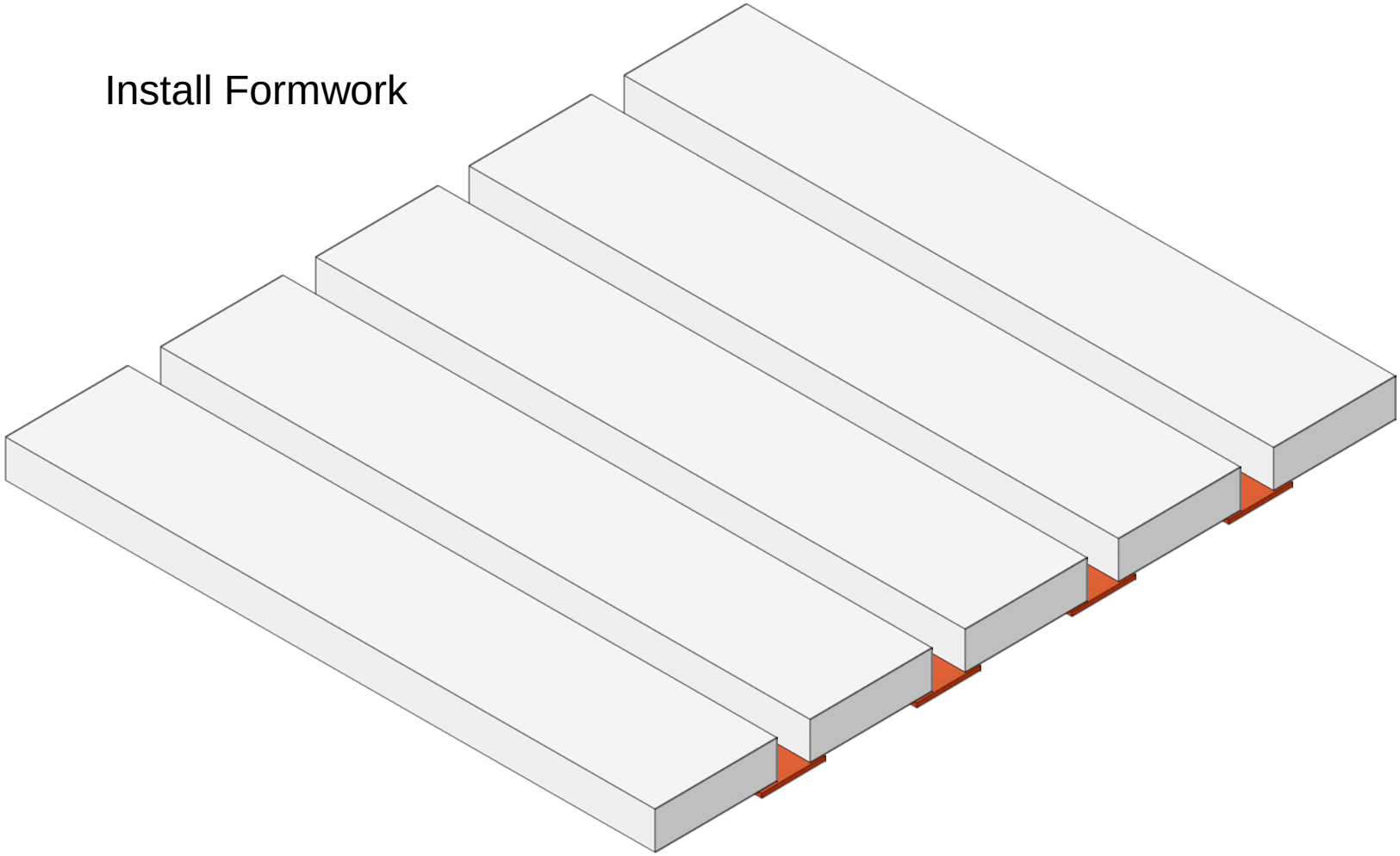


Precast Panel Details



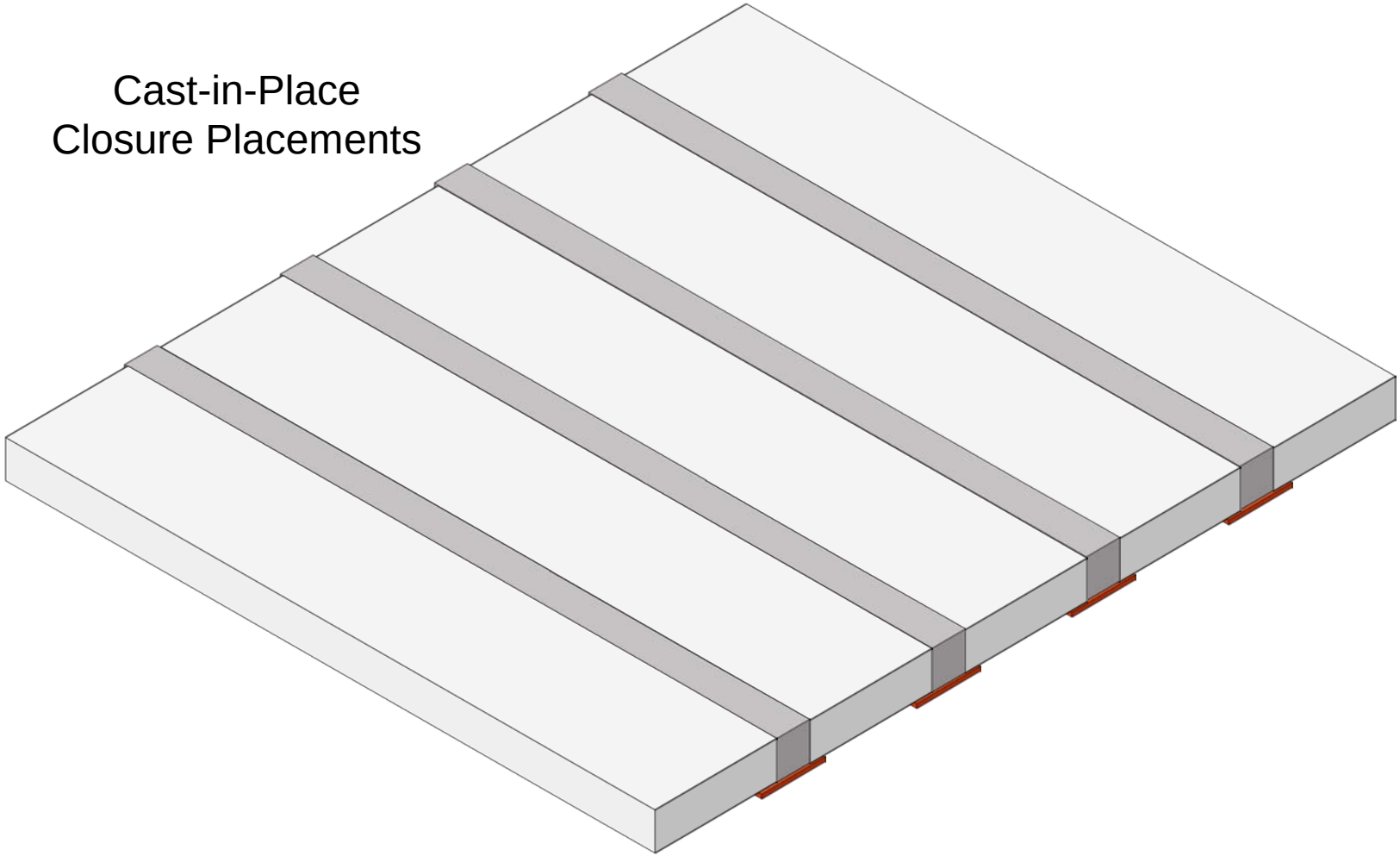
Superstructure Construction Sequence

Install Formwork



Superstructure Construction Sequence

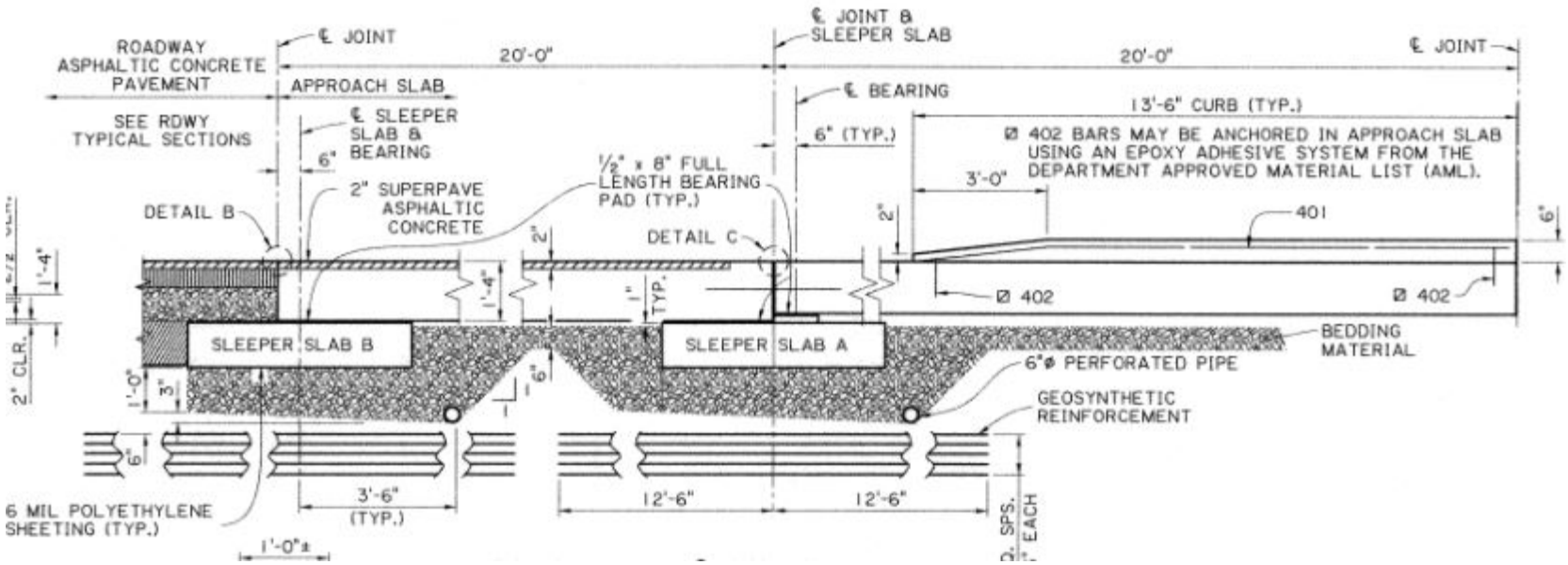
Cast-in-Place
Closure Placements



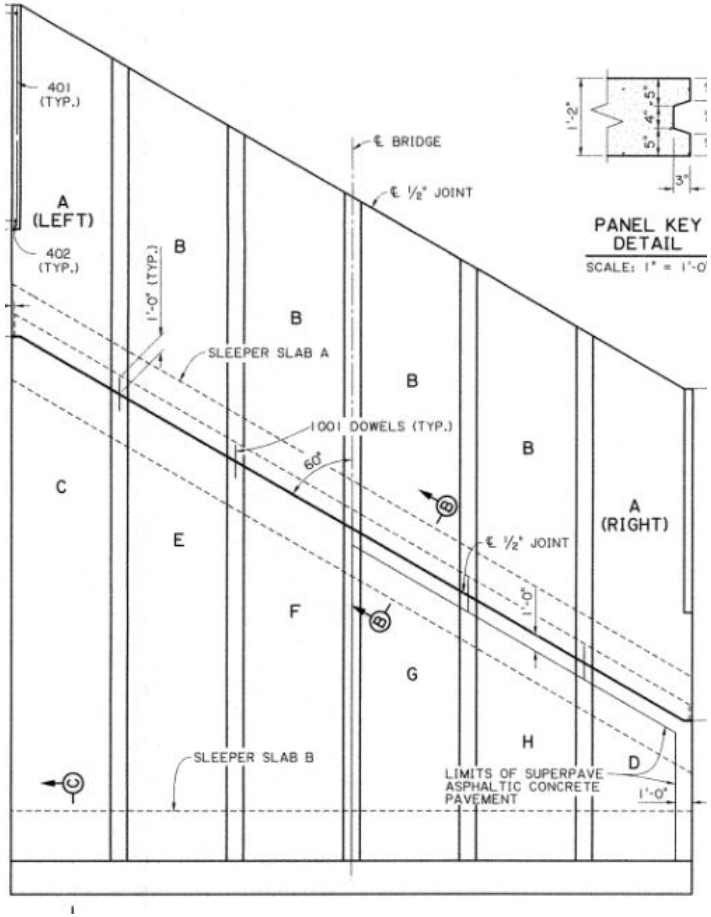
Precast Approach Slab Requirements

- Designed as simple span units
- Sleeper slabs
- Geosynthetic reinforcement underlayment
- Eliminate approach slab to roadway skew

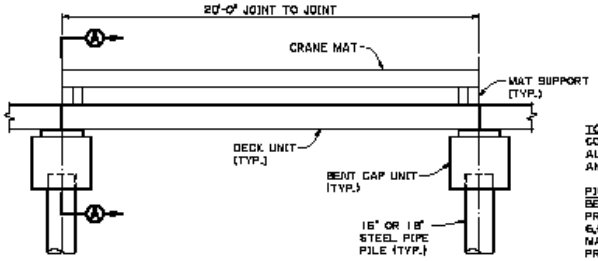
Approach Slab Typical Section



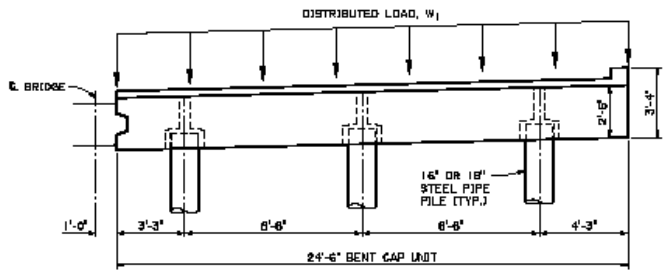
Approach Slab Plan View



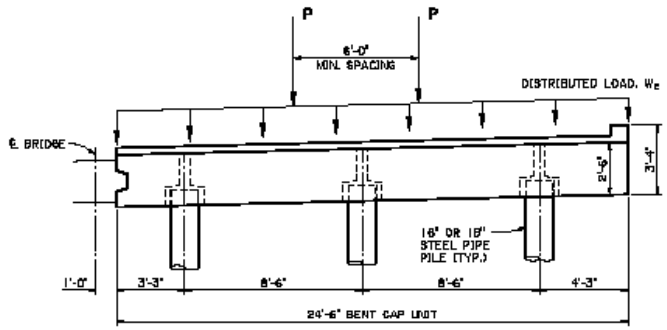
Construction Details



ELEVATION
ALLOWABLE CRANE MAT
SCALE: 3/8" = 1'-0"



SECTION A-A
ALLOWABLE DISTRIBUTED LOAD, ONLY (W_1)
SCALE: 3/8" = 1'-0"



SECTION A-A
ALLOWABLE POINT LOADS AND DISTRIBUTED LOAD (P+W_2)
SCALE: 3/8" = 1'-0"

TOP DOWN CONSTRUCTION: THIS STRUCTURE IS DESIGNED CONSIDERING TOP DOWN CONSTRUCTION. SEE THE ALLOWABLE LOADS BELOW. SUBMIT DESIGN CALCULATIONS AND SEQUENCE OF CONSTRUCTION FOR PROPOSED METHOD.

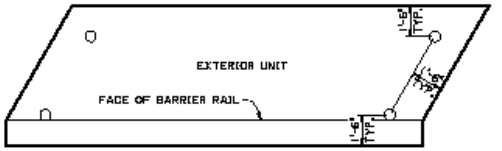
PICK-UP AND HANDLING: ALL PRECAST PANELS SHALL BE HELD AT THE PLANT FOR 10 DAYS AFTER CASTING, PROVIDED THE MINIMUM COMPRESSIVE STRENGTH OF 6,000 PSI HAS BEEN ATTAINED. PICK-UP POINTS SHOWN MAY BE MODIFIED FOR TRANSPORTATION PURPOSES, PROVIDED THE PANEL STRESSES ARE IN ACCORDANCE WITH THE DESIGN CRITERIA. THE MODIFIED PICK-UP POINTS SHALL BE SENT TO THE BRIDGE DESIGN ENGINEER FOR REVIEW. ALL LIFTING INSERTS SHALL BE REMOVED ONCE THE PANELS ARE IN PLACE AND SET AND THE INSERT VOIDS SHALL BE FILLED WITH A PATCHING MATERIAL FROM QPL NO. 49. THE PATCHING MATERIAL MUST MEET OR EXCEED PRECAST PANEL CONCRETE REQUIREMENTS FOR STRENGTH AND PERMEABILITY.

CRANE MATS: CONTRACTOR SHALL PROVIDE CALCULATIONS FOR CRANE MATTING OVER PRECAST PANELS. CALCULATIONS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER, LICENSED IN THE STATE OF LOUISIANA, AND SUBMITTED FOR APPROVAL.

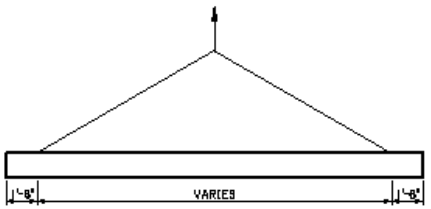
DISTRIBUTED LOAD, W_1	
CAP DEAD LOAD	0.5 TONS/L.F.
PANEL DEAD LOAD (2 SPANS)	1.5 TONS/L.F.
ALLOWABLE CRANE LOAD	9.0 TONS/L.F.
TOTAL ALLOWABLE CONSTRUCTION LOAD	11 TONS/L.F.
MAX SERVICE PILE LOAD	193 TONS

ALLOWABLE LOADS SHOWN IN TABLES ARE AASHTO LRFD SERVICE LOADS WITH A FACTOR OF SAFETY OF 1.0. WEIGHT OF THE CRANE MATTING HAS NOT BEEN CONSIDERED. CONTRACTOR IS RESPONSIBLE FOR REDUCING ALLOWABLE CRANE LOAD IN ORDER TO ACHIEVE THE DESIRED FACTOR OF SAFETY. THE TWO UNIQUE LOADING CONDITIONS SHOWN IN SECTION A-A SHOULD BE CONSIDERED TO BE MUTUALLY EXCLUSIVE. FOR EXAMPLE, THE CRANE LOADS PLACED ON THE BRIDGE SHOULD BE EITHER A DISTRIBUTED LOAD OR A PAIR OF CONCENTRATED LOADS, NOT A COMBINATION OF THE TWO.

DISTRIBUTED LOAD, W_2	
CAP DEAD LOAD	0.5 TONS/L.F.
PANEL DEAD LOAD (2 SPANS)	1.5 TONS/L.F.
POINT LOADS, P	
ALLOWABLE CRANE LOAD, P	125 TONS
MAX SERVICE PILE LOAD	95 TONS



UNIT PICK-UP POINTS
NOT TO SCALE



PICK-UP DETAIL
NOT TO SCALE

CHECK PRINTS

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION, BIDDING, NEGOTIATION, CONVEYANCE, SALES OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT.

Louisiana Department of Transportation and Development

PRECAST SLAB SPAN BRIDGE
40' CLEAR ROADWAY
90° SKEW ONE-WAY TANGENT
CONSTRUCTION DETAILS

SHEET NUMBER 8
SHEET 1 OF 1

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