



A SunCam online continuing education course

Accelerated Bridge Program

An Introduction Prefabricated Bridge Unit (PBU) Construction

by

John E. Kristensen PE., PLS., PMP.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course



Introduction

In order to meet the needs of the nation's failing infrastructure many State Department of Transportations are instituting an accelerated bridge construction program. These programs require corrections to existing bridges in a shortened time frame with as little inconvenience to the traveling public as possible. Massachusetts Department of Transportation's Fast 14 is a great example of an accelerated bridge program that constructed 14 bridge replacements in 10 weekends of a single summer construction season. To shorten the construction time frame associated with traditional cast-in-place bridges, projects have begun utilizing Prefabricated Bridge Units or PBU's for short. These types of bridges offer many benefits to owners like reduced costs, reduced construction time, reduced environmental impacts, and reduced maintenance of traffic. These benefits can be achieved while utilizing local labor and materials, and better



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

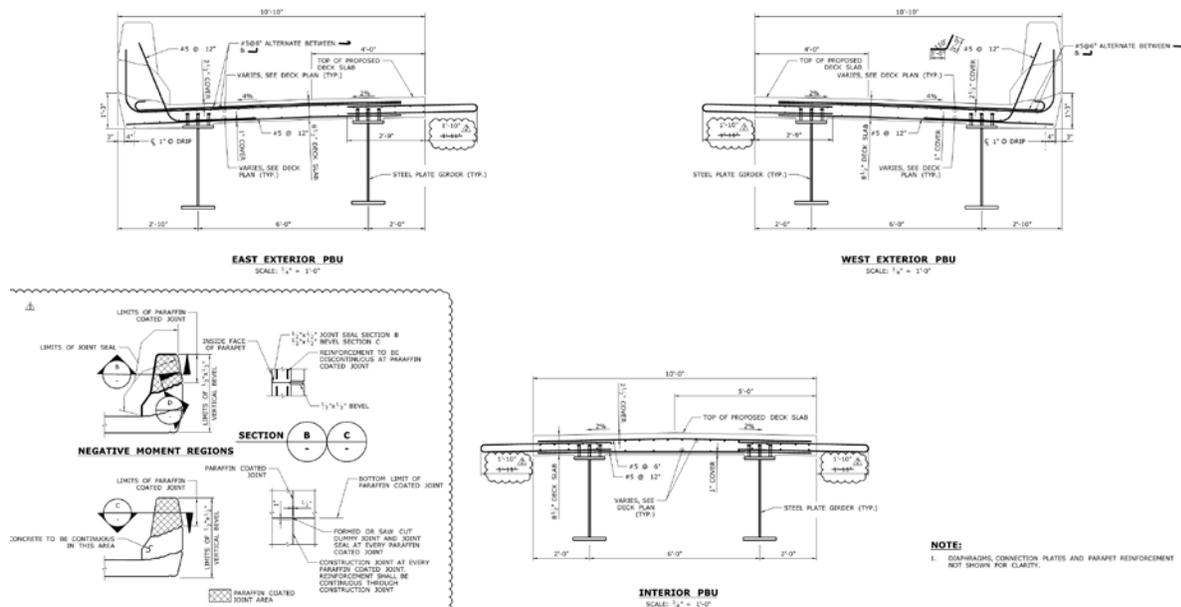
means of quality control. These bridges can accommodate highways, railways, and rapid transit, in both urban and rural environments. Depending on the location of the casting facility and the methods used for casting and erection, they can be straight or curved alignments, and can span difficult obstructions and terrain. However, to maximize the efficiency in casting and erection, they are typically used for regular shaped, simple span bridges of short to medium length.

Prefabricated Bridge Units can be manufactured at either onsite or offsite facilities, and either in full or partial width sections, depending on the transportation and erection method. The units can be erected by traditional crane “pick and set” methods but can also be placed in a “bridge slide in” utilizing high powered strand or hydraulic jacks, or lifted and hauled into place with specialized SPMT (Self-Propelled Modular Transporter) Trailers. The course will be broken down into Three basic sections: Unit Manufacturing, Superstructure Erection, and Finish Activities. Each section will be further broken down by: set up and staging, construction, quality control, and completion.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Prefabricated Bridge Unit Manufacturing



[View Larger Image](#)

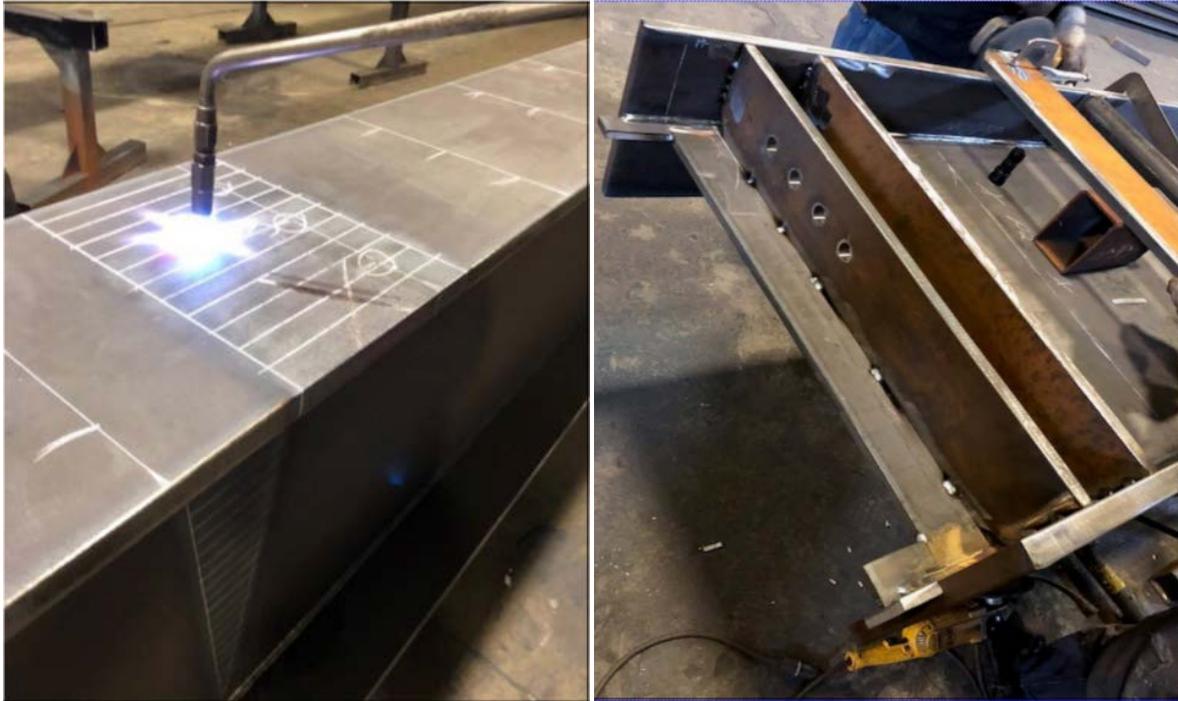
The basic building blocks for the Prefabricated Bridge Unit are the Precast Concrete Units themselves. The typical Prefabricated bridge unit is a composite section of a bridge superstructure consisting of the structural steel and the reinforced concrete deck. It may or may not include the final wearing surface or other superimposed elements like the parapets or raised medians and sidewalks.

There are different means of casting the units. The production of the units is critical to the success of the project. The units are a major controlling factor in the quality, schedule, and profitability of the bridge and therefore they require a well prepared plan to fabricate, store, and transport. The five sections for casting the units are: Site Selection and Preparation, Casting Cell Construction, Concrete Placing and Curing, Storage and Finishing, and Loading and Transporting which will outline the fundamentals for a manufacturing plan.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Structural Steel Suppliers



Although not part of the concrete casting, the first component to consider is the structural steel. Whether the main girders of the bridge are standard rolled shapes or built up plate girders, the fabrication of bridge structural steel is highly specialized work and should be contracted out to a State Department of Transportation certified facility. This is not an operation normally self-performed.

First shop drawings based on the contract design drawings will be detailed to show weld types and locations, dimensions and camber requirements of the girders, materials data, connections and splicing, required coatings, diaphragms and other miscellaneous pieces, and any other structural and architectural features. These drawings will be submitted for approval to the owner and fabrication cannot begin until they are returned with no exception.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course



The raw steel will be delivered to the fabrication yard. The pieces will be brought into the shop for cutting, welding, and cleanup. Each piece will be given a distinct piece mark and erection/bolt up drawings will be provided to detail the sequence and layout each piece must be placed in the structure to ensure proper fit. Protective and architectural coatings will be shop applied as a last step in the fabrication process.

The steel will be loaded on to transports (usually trucks) to be hauled to the PBU concrete pre-casting facility. Depending on the weight, height, width, and permitting of the loads, the steel can be shipped loose in individual pieces or can be pre-bolted and shipped in pairs to the pre-caster. Concrete precast facilities are specialists in concrete



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course



but are not necessarily experienced in structural steel work. The steel fabrication shop has the proper tools and inspection staffing to check that correct bolt torquing and welding procedures are followed.



Paired girders loaded for transport



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Precast Concrete

Site Selection and Preparation



1. There are many decisions to be made when considering the PBU casting site. Probably the most significant is whether to choose an already functioning pre-cast facility or to set-up and run your own. Although there will usually be several local pre-casters, their facilities and experience history may not be in manufacturing Premanufactured Bridge Units. The site preparation details should be similar whether outsourcing or self-performing, so what factors influence the choice?

Certainly, past history of similar structures would be an important factor. These sites would have the specialized equipment, trained personnel, and permitting needs for a quick start up and timely production. Secondly, distance and transportation considerations (local to highways, railways, or waterways) would be evaluated. Lastly, budget issues including tax-implications will affect the decision process (the most experienced supplier may not be cost effective).



An Introduction Prefabricated Bridge Unit (PBU) Construction A SunCam online continuing education course

2. Once the decision of “who” is producing the segments is decided, the “how” to produce the segments is next. For simplicity of writing we will assume the decision is to self-perform. The first decisions would be site selection. Factors that would influence this decision would include: Availability of Concrete (transit-mix delivered from an existing supplier or self-production from a mobile batch plant), distance to the erection site and available transportation methods for delivery (railways, waterways, and highways), Permitting and Zoning, Adequate Storage Area, Environmental and Geotechnical Design Criteria, Proximity to a Skilled Workforce, etc...

Casting Cell Construction



Stay-in-place (SIP) deck pans form the bottom of PBU slab

The site should be arranged in an efficient organized manner for producing the precast segments. The number of casting cells constructed is directly related to the scheduling needs of the project. Fast paced schedules will need additional cells to achieve production requirements. Each casting cell requires a sizable investment in time, property, and money; this must be balanced against the schedule to determine the most



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

efficient project course. At a minimum, there should be enough cells constructed so adjacent PBU castings can be manufactured with matching geometry. If all units in a span's cross-section cannot be cast adjacent and simultaneous, then a pre-erection fit-up will be necessary to ensure the proper alignment.



An engineer should design the casting cells and should consider; geotechnical data for foundation type, reinforced concrete design for the base slab of the cell, formwork design (falsework, framing, and concrete forms), walkways and access scaffolds, shelters, and miscellaneous electrical/mechanical.

Major components of a casting cell: Base slab and foundation, bearing pedestals, forming system (one picture shows permanent metal “stay-in-place” forms while the other shows temporary wooden forms which will be stripped from the concrete after the cure period), rebar storage, survey control points, and shelters. Specialized and general equipment: Steam generators, chillers, straddle lifts, man lifts, gantries, conveyors, forklifts, RT cranes, welders, generators, winches, survey equipment, etc.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Some miscellaneous materials would include: dunnage, grout, form release, curing compound, bond breakers, epoxy, etc.

The casting cell mimics the conditions of the bridge substructure elements that support the PBU's in their final location. Temporary support pedestals are located by surveyors and constructed to the horizontal and vertical dimensions of the bridge bearing assemblies. The paired structural steel girders are placed on the pedestals and are re-surveyed at the 1/10th points along the girders to check the asbuilt camber elevations. These elevations are checked against the plan deflection design and the final deck elevations to determine the form heights for the beam haunches and the bottom of deck panels. Longitudinal and transverse bulkheads are placed at the deck perimeter and the reinforcing steel is set in place. Final pre-pour quality control checks are performed to ensure everything is correct and once released, the PBU is ready for concrete casting.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Concrete Placing and Curing



Once the pre-pour quality check is complete, concrete placement can begin. Depending on the site, the concrete can be placed with pump trucks, conveyors, crane and buckets, or just through the truck shoots directly into the forms. Laborers place and vibrate the concrete roughly into position. Carpenters watch the formwork and make any adjustments needed if any members loosen. Lastly finishers strike the concrete at grade and provide the specified texturing to the exposed surfaces.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course



Before and during the concrete placement, quality control tests must be performed both at the plant for production and at the placement. Air content, temperature, and slump testing, plus the casting of concrete cylinders for laboratory compressive strength testing are the minimum tests needed to ensure a quality cast.



Quality Control Technicians reviewing Slump and Air Content tests

To strike the deck to grade, the finishers will use a straight edge which probably rides the bulkhead forms to provide the unit's profile grade. The straight edge can be a roller screed or a vibratory air screed but depending on the quantity of concrete, a well



An Introduction Prefabricated Bridge Unit (PBU) Construction *A SunCam online continuing education course*

shaped 2x4 can provide the surface just as well (usually a post-erection deck treatment is applied for rideability so the finish can be rough). Texturing will probably be a roughened surface as either the final wearing surface or to provide a bond with the ultimate final surface material. The roughened surface can be finished with a broom, tined with a rake, or dragged burlap.

After finishing, the concrete will be covered with curing materials to protect the structure from excessive heat or cold, or from drying out due to winds. Once covered the concrete must remain undisturbed until the engineer determines the curing period is over.

Once the curing is complete, superimposed elements like parapets and sidewalks may be added (if required by the PBU) or the unit can be moved to storage and the cell can be made ready for the next units and the procedure is repeated.





An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Storage and Finishing



After a curing period determined by the designer, field test cylinders are broken to determine if the unit is strong enough to remove formwork and falsework supports, and is ready to be finished and set for storage. The strength required depends on the design and will be a factor of the strength gained during the initial cure and the dimensional properties of the bridge.

For small simple span structures an elaborate site plan may not be necessary, as long as the units are clearly marked for identification and access to their storage can be easily made when necessary. For more complex bridges, an organized storage plan must be formulated early in the casting process. Not only should the location of each segment be established in an orderly manner for storage, but also for documenting the



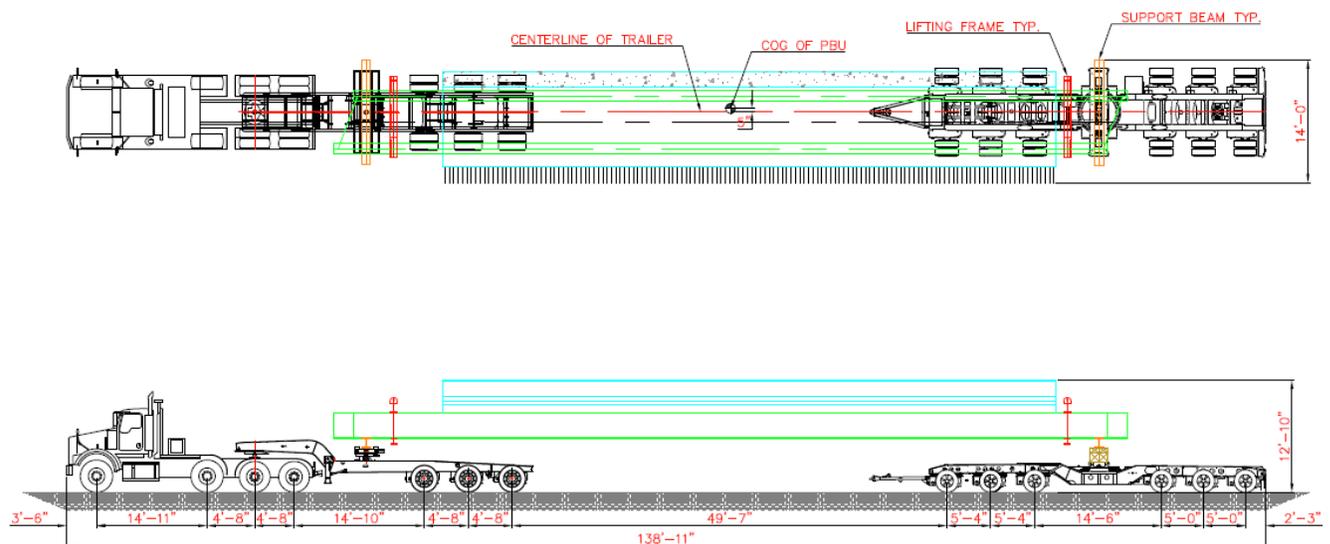
An Introduction Prefabricated Bridge Unit (PBU) Construction A SunCam online continuing education course

various stages of completion and acceptance, as well as, availability to deliver the segments to the bridge site when needed. Time and efficiency losses caused by searching for segments will add up quickly especially if multiple movements are needed for access. With over 400 PBU's of varying lengths, widths, and curvature, scheduled to be delivered and erected in multiple phases and operations, the MASSDOT Chelsea Viaduct Project is a good example of a complex accelerated structure where a storage and access plan is critical.

While in storage, any pointing, patching, and architectural finishes can be applied (care must be taken when any repairs are made to an adjacent unit's face to ensure the fit is not jeopardized). Any bond-breaking agents applied during casting must be power-washed off and the adjacent match face must be clean (some designers specify an exposed aggregate finish on the concrete joints).

Note: The units should be stored on stabilized grade using dunnage placed under the structural steel in close approximation to the final bearing seat configuration to ensure the unit will not rack and lose shape.

Loading and Transporting.



[View Larger Image](#)



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Depending on the location of the storage area to the bridge erection site, the method of transportation will differ. Whether it is by trucks (on and off road), rail, or barge, several factors apply to all: hauling restrictions – time and weight, permits, environmental and noise ordinances, and distance. The most direct routes might not be the most cost effective or available. A necessary decision will also include whether to purchase, rent, or subcontract the loading and transporting. The lifting and handling of these large castings is specialized work and any errors can be catastrophic therefore, the services of professionally experienced subcontractors are advised.

Note: the PBU's must be transported to the bridge for erection in the same relation as they were cast





An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Substructure Preparation

Whether the PBU's will be erected on a newly constructed substructure or if the project is part of a rehab to an existing bridge, it is important to perform a final check of the beam seats and bearing assemblies for line and grade to make sure the PBU's will sit correctly after erection. The delivery and erection operations require coordination with many subcontractors, suppliers, and project stakeholders, it would be difficult to make last minute adjustments if the PBU's do not fit.

Any adjustments to the beam seats can be made by grinding the concrete if it is too high or not smooth, or stainless-steel shims can be provided if the seats are too low. A review of any adjustments should be given to the designer to confirm the work is allowable and within their tolerances.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

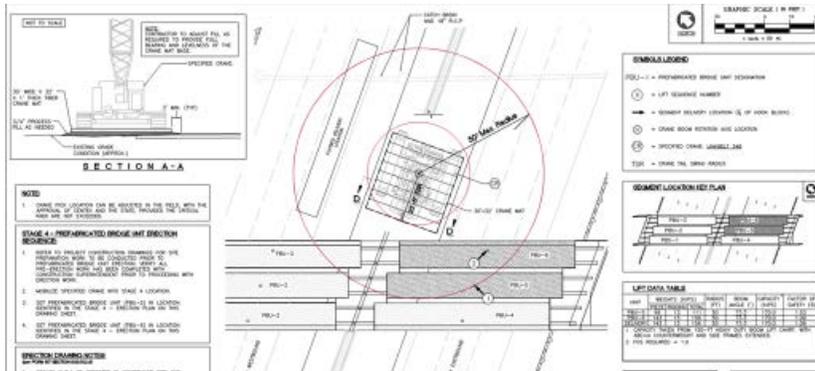
Superstructure Erection – Traditional Crane Erection



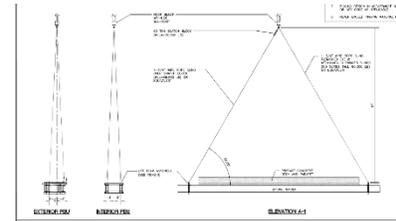
First a crane erection plan - design and working drawing submittal must be put together. The plan will include crane information, rigging and lifting devices, site information including ground bearing pressures and possible obstructions, and traffic control if needed. The sequence of erection will be detailed and any temporary bracing or supports will be shown if the initial erection is not self-supporting.



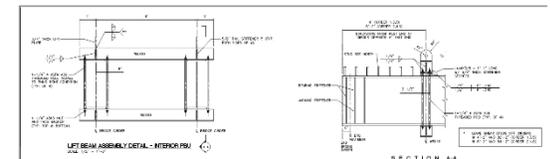
An Introduction Prefabricated Bridge Unit (PBU) Construction A SunCam online continuing education course



[View Larger Image](#)



[View Larger Image](#)



[View Larger Image](#)

A pre-erection meeting is necessary to discuss the plan and detail communications. All safety concerns should be reviewed at this meeting including the emergency response plan should anything go wrong.



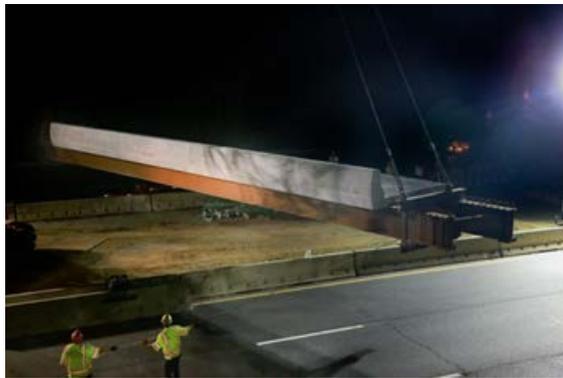
- (1) The PBU's are delivered to the crane.
- (2) Rigging is connected to the lifting points.
- (3) Tag lines are secured and controlled by the ground crew to help control the suspended load.
- (4) The crane picks the PBU off the transport and swings it to the bearing pad position.
- (5) The PBU is lowered to the bearing assemblies and the placement is checked for the correct positioning (the PBU must be lifted and repositioned if out of tolerance or else the fit-up of other pieces will not be correct).
- (6) Bracing will be installed prior to releasing the load from the crane if the unit is not self-supporting.
- (7) The load is released, and the crane is made available for the next pick.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course



(1, 2)



(3,4)

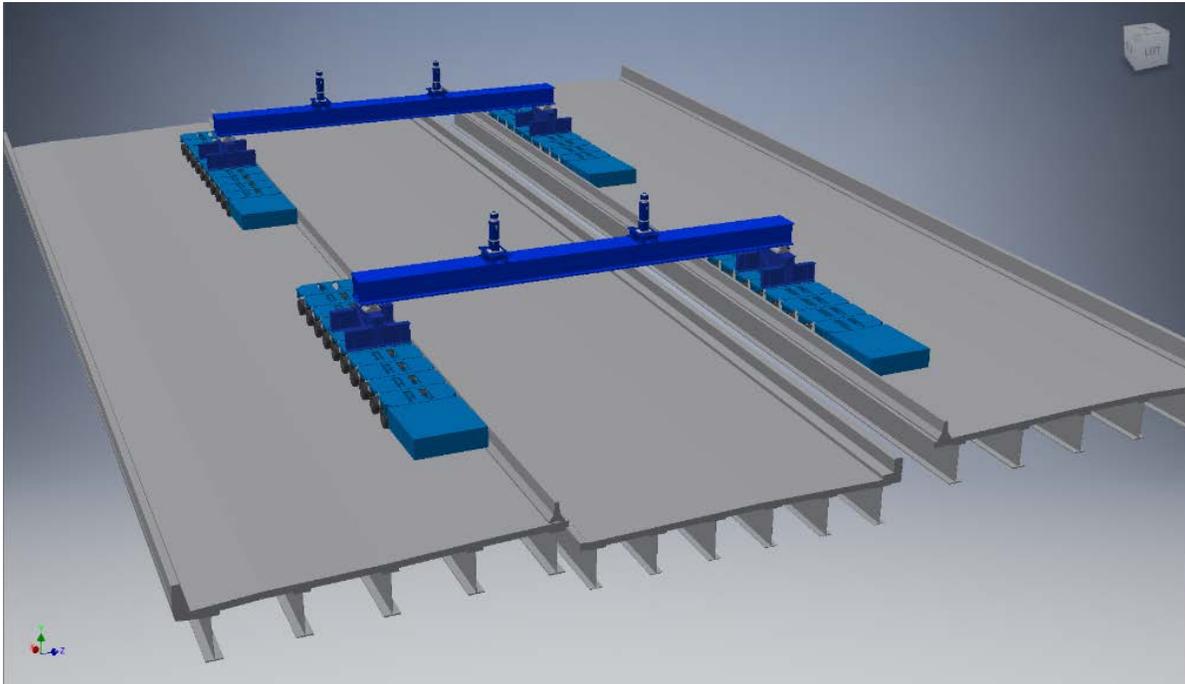


(5,6,7)



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Superstructure Erection – SPMT (Self-Propelled Modular Transporter)



SPMTs (self-propelled modular transporters) are a series of platform vehicles with a large system of wheels used to haul large, heavy, difficult loads over short distances. The number of modules and wheels distribute the weight to allowable wheel loads for route bearing capacity. SPMTs are used for transporting massive objects such as large bridge sections, oil refining equipment, motors and other objects that are too big or heavy for traditional tractor trailers. For added control, trucks can provide traction and braking for the SPMTs on inclines and descents.

SPMTs are used in many industries worldwide such as the construction and power generation industries. They can be found in shipyards and offshore industry, and at road transportation and plant construction sites. Recently they are being used to replace bridge spans as part of the DOTs accelerated bridge initiatives.



An Introduction Prefabricated Bridge Unit (PBU) Construction *A SunCam online continuing education course*

A SPMT usually has multiple axles and modules can be placed in a line and/or side by side. The axles are capable of individual steering from a computer-controlled grid.

Two (or more) axles placed side-by-side are called an axle line. All axles are individually controllable, so they steer correctly and distribute weights evenly. Each axle can swivel through 270°, with some manufacturers offering up to a full 360° of motion. The axles are coordinated by the control system to allow the SPMT to turn, move sideways or even spin in place. Some SPMTs allow the axles to telescope independently of each other so that the load can be kept flat and evenly distributed while moving over uneven terrain. Each axle can also contain an individual drive unit.

A hydraulic power pack can be attached to the SPMT to provide power for steering, suspension and drive functions. A single power pack can drive a string of SPMTs. SPMTs often carry the world's heaviest loads on wheeled vehicles so they are very slow, often moving at under one mile per hour while fully loaded. Some SPMTs are controlled by a worker with a hand-held control panel, while others have a driver cabin. Multiple SPMTs can be linked (lengthwise and side-by-side) to transport massive building-sized objects. The linked SPMTs can be controlled from a single control panel.



SPMT loaded with power generator ex. of heavy move



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

In order to use SPMTs, the PBUs are constructed relatively close to the bridge in a casting yard specifically setup for the construction project. The PBUs will be built on raised platforms so once complete, the SPMTs can drive in under the PBUs, lift the load off the temporary platforms, and then once loaded, transport them to the bridge location. Since the SPMTs will be configured for the weight and size of the load, the PBUs will usually be built in full bridge span sections.

First a site casting and transporting plan is created. The casting cells will be designed as detailed earlier in the course with the added design of the scaffolding needed to make the raised platforms needed for the SPMTs. The number and type of SPMT modules will be determined and if not already available, a suitable haul road will be designed and built for the chosen route. The plan will detail the sequence of construction, the sequence of transporting-lifting-erection, traffic control, rigging, and any temporary supports and bracing.



SPMT move median PBU span held with carrier beam and strand jacks

A pre-erection meeting is necessary to discuss the plan and detail communications. All safety concerns should be reviewed at this meeting including the emergency response plan should anything go wrong.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

(1) Erect foundations and scaffold towers, (2) deliver and set structural steel on towers, (3) form, rebar, place, and cure concrete superstructure elements, (3A) demolish existing bridge superstructure and prepare for new PBUS, (4) mobilize and load SPMTs, and transport to bridge, (5) raise, position, and set PBUs on bearing assemblies of substructure.



(1, 2, &3)



(4 & 5)



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Superstructure Erection – Bridge Slide



roller bearing support under structural steel with strand jack assembly behind

Similar to the section on SPMTs, the PBUs are constructed close to the bridge in a casting yard specifically setup for the construction project. However, for a Bridge Slide operation, the PBUs will be built on raised platforms adjacent and within inches, along-side the existing bridge. Once the PBU's are complete, the existing bridge superstructure will be demolished and removed. Then the PBUs will be pushed or pulled and slid from their temporary shoring platforms to the bridge location. The PBUs will usually be built in full bridge span sections and slid/placed directly onto the bearing assemblies at the final support locations.

First a site casting and sliding plan is created. The casting cells will be designed as detailed earlier in the course with the added design of the scaffolding needed to make the raised platforms needed to align the PBU's with the existing structure. The method of sliding the PBU's will be determined. Depending on the weight, geometry, and access, strand jacks which utilize high strength steel cables "strands" can be used to pull the PBUs from the temporary supports or alternatively, high strength hydraulic jacks can push the PBUs. The temporary supports will include a sliding beam with a track for roller bearings to carry the PBU through the slide. The plan will detail the sequence of



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

construction, the sequence and method of sliding, traffic control, rigging, and any temporary supports and bracing.



Strand Jack Assembly



Roller Bearings





An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Pulling Beam, Rollers, and Sliding Tracks



Hydraulic Jacks w/Teflon Sliding – Pushing Trays

A pre-erection meeting is necessary to discuss the plan and detail communications. All safety concerns should be reviewed at this meeting including the emergency response plan should anything go wrong.

(1) Erect foundations and scaffold towers, (2) deliver and set structural steel on towers, (3) form, rebar, place, and cure concrete superstructure elements, (4) mobilize and load SPMTs, and transport to bridge, (5) raise, position, and set PBUs on bearing assemblies of substructure.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Finish Operations



closure pour concrete being placed with telescoping conveyor truck

Especially with the crane pick & set method, cast in place closure pours at the interface between PBU's will complete the structure. The closure pours will be longitudinal where full width PBU's are not utilized and transverse at bridge joints and approach slabs.

The Closure Pour Concrete is usually one of the following:

- 1.) High Performance Concrete (HP) – high strength, low permeability – durable concrete
- 2.) A high early strength HP concrete if the project schedule requires a faster strength gain than provided by normal HP Concrete (weekend closures requiring the re-opening of the bridge to commuter traffic usually need accelerated mixes)

Concrete Mix Designs specific to the project will be submitted to the owner for approval as part of the PBU Quality Control Plan. Tests will be necessary to demonstrate the adequacy of the concrete mix including, but not limited to: slump, air content, temperature, initial set and final set, and compressive strength tests shall be determined on field cured cylinder at 7 days and 28 days, as well as at 9 hours, 12 hours, 15 hours, 18 hours, 24 hours, 30 hours, 36 hours, 42 hours, 2 days and 3 days depending on the

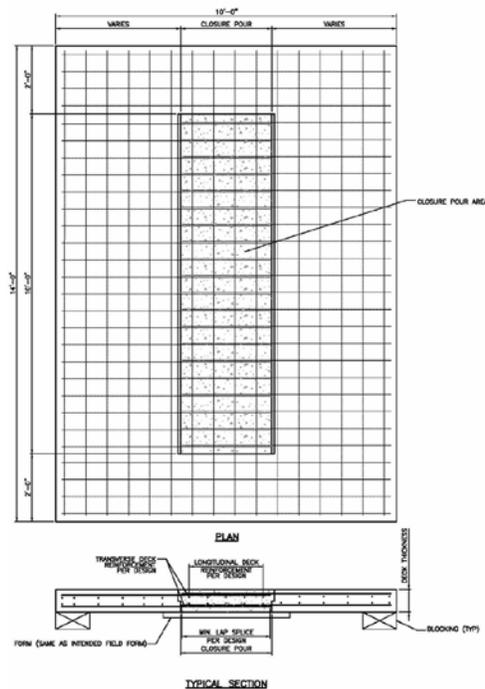


An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

accelerated need of use. Additionally, a confined shrinkage test may be required if low shrinkage properties and reduced field cracking are project criteria.

In addition, a trial placement may be required to demonstrate proper mix design, batching, placement, finishing and curing of the closure pour concrete. The trial placement shall simulate the actual job conditions in all respects including plant conditions, transit equipment, travel conditions, admixtures, forming, the use of bonding compounds, restraint of adjacent concrete, placement equipment, and personnel. The trial shall also demonstrate the ability of the concrete to accept any follow-on final surface materials as required.

A typical trial placement mock-up panel is shown in the following diagram. The final accepted trial placement testing shall be used to establish the final acceptance testing protocol for the field placements.



[View Larger Image](#)



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Closure pour formwork will be suspended below the PBU. For ease of installation and removal, threaded inserts can be cast into the bottom of the units to receive all-thread rods needed to hang the form support joists.



Concrete will be delivered, placed, and finished within a specified time to avoid workability issues with the initial set. High early mixes contain an accelerating admixture that will “flash” set the concrete once activated. Manipulating the concrete after this occurs may damage the concrete surface and jeopardize the durability of the closure pour.

The concrete curing methods shall be developed by the Contractor as part of the Quality Control Plan. The curing methods used in the production placements shall be the same as the curing methods used for the trial placement. The curing method should protect the concrete from excessive heat or cold, should provide an impervious layer to keep moisture in the concrete and prevent it from drying out, and it should prevent other exposures from the outside environment like rain, wind, and contaminants for the duration of the required curing period.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course



After curing, the finished closure pour concrete surface shall be inspected for cracks. The inspection and any necessary repairs shall be completed prior to the preparation of the deck final surface treatment.

Depending on the design, some PBU's have an integral concrete wearing surface as part of the deck thickness while others may have an overlay of asphalt or concrete.

If the PBU concrete provides the final exposed deck surface, no matter how accurate the geometry control is with casting and erecting, the riding surface will be constructed by the individual segments and will reflect any imperfections across each segment joint. This will not matter for railway bridges or other structures where the segments are not the final riding surface. For bridges with rideability requirements, a longitudinal grinding is recommended to eliminate these imperfections and a transverse grooving can be added to improve skid resistance.

If a follow-on surface is applied, the PBU finish must be compatible with the product and cleaned to promote a good bond between the layers. A waterproofing system may be applied as an intermediate layer to provide improved durability and longevity of the concrete.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Conclusion



This introduction is a brief overview of the operations for an Accelerated Bridge Program - Prefabricated Bridge Unit construction. Future courses will be written specific to each section of this course to provide a more in-depth review of each type of operation. This construction is very specialized and no matter how in-depth the courses are written there is no substitute for experience. Many specialty subcontractors and suppliers offer onsite consulting services as a supplement to the construction staffing. To organize a new construction project, managers should strongly consider these additions as well as the support of an experienced construction engineering firm. The consulting experience will help train the project personnel, troubleshoot problems, and give confidence to the owner. Additionally, a well structured quality control program is a must. From design to casting to erection, unaccounted errors can have significant impacts to cost, schedule, and **SAFETY**.



An Introduction Prefabricated Bridge Unit (PBU) Construction
A SunCam online continuing education course

Lastly, safety must be the constant and most important focus of every operation. Because of the accelerated nature of these bridges (mostly described in the opening paragraphs of the course) they are often chosen to be constructed in some of the most adverse and congested areas imaginable. Working with extreme weights, at excessive heights, and around pedestrian and vehicle traffic requires safety diligence from every stakeholder. From Demolition to final surface, a crane erected superstructure can be completed in a month, while the erection by slide or SPMTs can be done in a weekend. Even at this pace, with constant planning they are often completed with zero OSHA recordable or lost time accidents. Please be safe.

