

Technical Proposal

Volume 2: Preliminary Performance Plans and Design-Build Technical Solutions  
Electronic Copy



# ***PENNSYLVANIA RAPID BRIDGE REPLACEMENT PROJECT***



Submitted to:  
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Preliminary Project Baseline Schedule	



# Preliminary Project Management Plan

## PRELIMINARY PROJECT MANAGEMENT PLAN

Plenary Walsh Keystone Partners (PWKP) is structured to provide PennDOT the most complete solution of the rapid replacement of 558 bridges, and to maintain them for 25 years by providing a team of industry leaders and proven Pennsylvania-based subcontractors to deliver unmatched resources at every level of the organization. PWKP is focused on minimizing public impacts with a schedule that meets PennDOT's requirements and substantially completes all bridges by December 31, 2017.

### PROJECT MANAGEMENT APPROACH

#### Management Structure and Staffing Plan

PWKP is assembled to streamline Project delivery, minimizing risk at all levels and seamlessly integrating the complex financing, design, construction, and maintenance needs of the Project. Key components of PWKP's structure at each level of the organization include:

#### Development Entity (DE)

- » Active involvement of DE staff during design development, construction, and maintenance.
- » Vertically integrated team to align each member's interests with the overall success of the Project.

#### Design

- » Technical Work Groups (TWGs) dedicated to all major design and delivery disciplines.
- » Interdisciplinary reviews among TWGs.
- » Early PennDOT participation in design development.

#### Construction

- » Three regional field offices, West, Central, and East, with complete and comprehensive management teams, the West office also serving as the main hub office for the Project.
- » Active involvement of diverse group of exclusive Pennsylvania based subcontractors.

#### Maintenance

- » Involvement of maintenance personnel in TWG meetings to address longevity concerns in design.
- » Comprehensive MMIS and structured renewal work program.



PWKP identifies benefits to PennDOT throughout this Technical Proposal with our Pennsylvania Rapid Bridge icon.



**PROVEN PERFORMANCE.  
LOCAL PRESENCE.**

+ **Plenary** is the largest dedicated P3 developer in North America and maintains a portfolio including the US 36 Managed Lanes Project in Denver, CO, and numerous availability payment based projects.

+ **Walsh Investors** has a successful track record of investing in Walsh Group affiliated construction projects. Walsh Investors helped the state of Indiana deliver its first P3 construction project.

+ **Walsh** is the nation's largest bridge builder and **Granite** is the #5 Transportation Contractor as rated by ENR. Each bring extensive P3 project experience.

+ **HDR** is experienced in both P3 and high-value high-profile bridge projects such as the Tappan Zee Bridge replacement and has bridge design experience in all 11 PennDOT Districts.

+ **Walsh Infrastructure Management (WIM)** personnel bring unparalleled experience in maintenance of assets for P3 projects including the Presidio Parkway in California and Pocahontas Parkway in Virginia.

+ Key Exclusive Subcontractors **Swank, Glenn O. Hawbaker**, and **J.D. Eckman** have maintained a strong presence in the Pennsylvania contracting community for nearly 200 years collectively.

+ Exclusive subconsultants **Larson Design Group** and **A.D. Marble** are intimately familiar with PennDOT's policies and practices, allowing PWKP to expedite NTP3 activities.

+ **TRC**, the team's CQAF, has 24 years of unparalleled experience providing construction and plant inspections in an equivalent role for PennDOT.

**Organization Chart:** Figure 4.1-1 shows PWKP's team structure and responsibilities. Figure 4.1-2 shows PWKP's personnel organization, demonstrating how firms and personnel will operate as a whole.

**Key Personnel:** Figure 4.1-3 shows the roles, responsibilities, and expectations of all Key Personnel.

FIGURE 4.1-1 FIRM ORGANIZATION

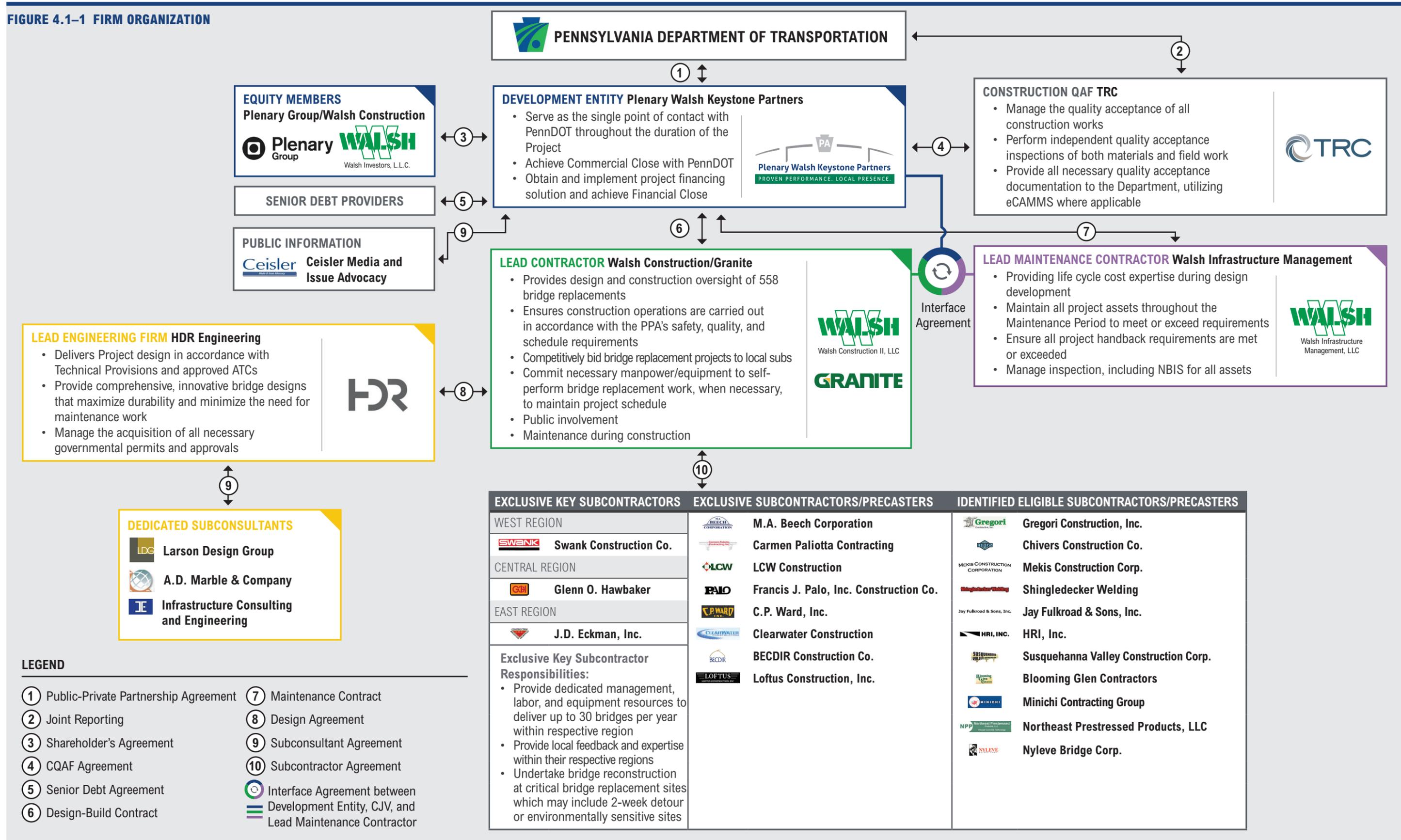
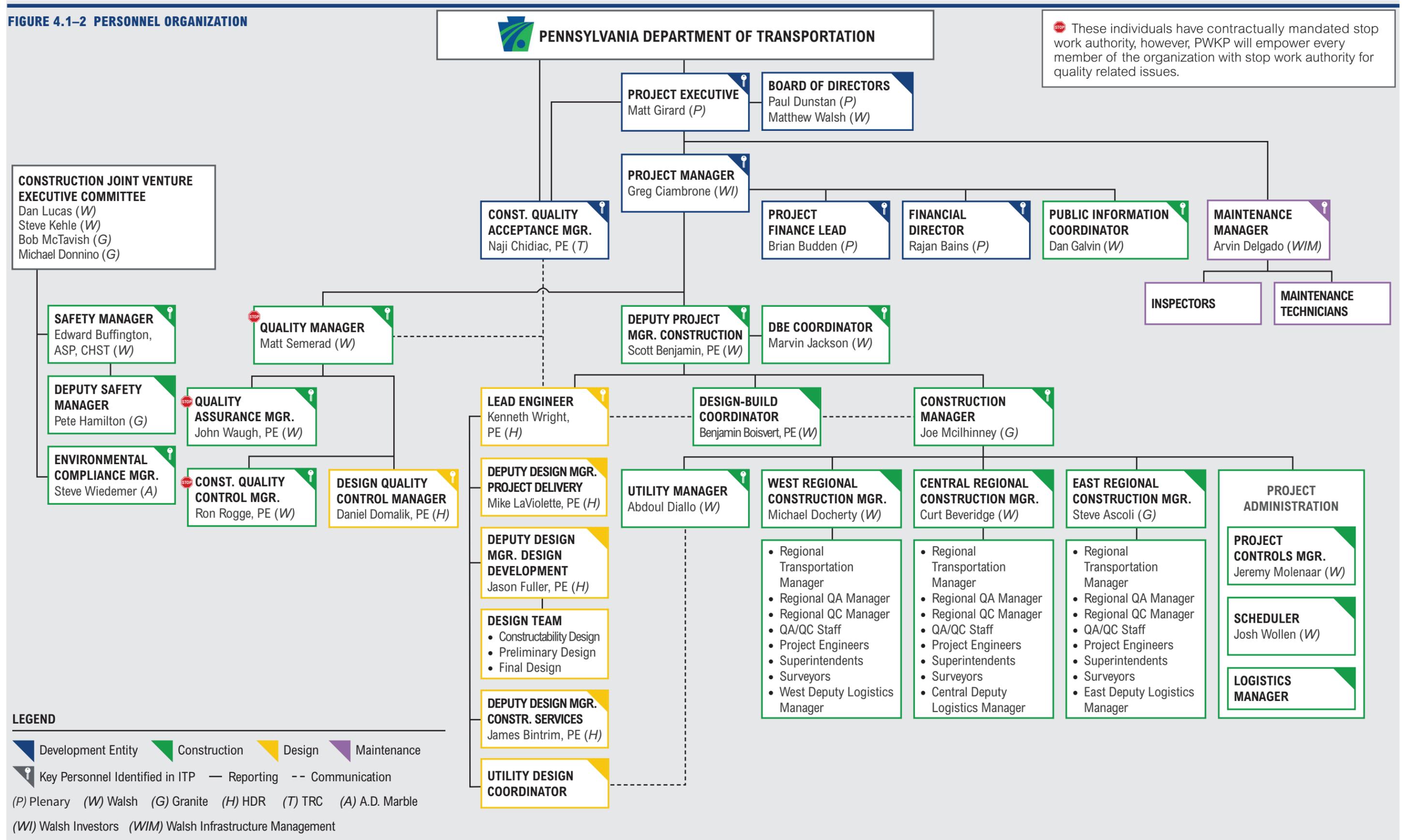


FIGURE 4.1-2 PERSONNEL ORGANIZATION



**FIGURE 4.1-3 KEY PERSONNEL & RESPONSIBILITIES**



**Project Executive**, Matt Girard  
 + 25 Years Experience  
**FC: 75% | D: 50% | C: 50% | M: 25%**

- Single point of contact to PennDOT
- Overall responsibility for the Project
- Leads integration of finance, design, construction, and maintenance, including the transfer from construction to the Maintenance Period
- Available as necessary to engage with PennDOT throughout the Term



**Project Manager**, Greg Ciambrone  
 + 27 Years Experience  
**FC: 100% | D: 100% | C: 100% | M: As Needed**

- Manages administration of all contracts within the Development Entity including the DB Agreement and CJV
- Overall P&L responsibility of construction
- Full time until 2 months after completion of all construction, Part Time as needed thereafter



**Project Finance Lead**, Brian Budden  
 + 15 Years Experience  
**FC: 100%**

- Secures and executes the most efficient financing plan
- Ensures all CP's and coverage ratios are met and maintained throughout the duration of the Project



**Financial Director**, Rajan Bains  
 + 25 Years Experience  
**FC: 100% | D: 25% | C: 25% | M: As Needed**

- Manages all Project financing concerns of the PWKP
- Manages the financial model
- Performs financial model updates with changes in forecast assumptions



**Maintenance Manager**, Arvin Delgado  
 + 13 Years Experience  
**FC: 25% | D: 25% | C: 50% | M: 100%**

- Overall responsibility for maintenance, rehabilitation, and handback operations, including all logistics, quality, and safety concerns
- Incorporates lifecycle cost into the design of Replacement Bridges
- Liaises with design and construction team to emphasize maintenance and whole life considerations
- Monitors performance and drives continuous improvement
- Full time commitment will begin upon Substantial Completion of the first replacement bridge



**Deputy Project Manager for Construction**, Scott Benjamin, P.E.  
 + 15 Years Experience  
**FC: 100% | D: 100% | C: 100% | M: As Needed**

- Administers all construction subcontracts
- Manages coordination of CQAF and PI activities
- Ensures construction, quality, safety, and environmental methods align with the PPA
- Monitors progress towards achieving Project objectives



**Construction Manager**, Joe McIlhinney  
 + 33 Years Experience  
**FC: 100% | D: 100% | C: 100% | M: As Needed**

- Leads the construction effort and is accountable for design-build delivery
- Responsible for the quality, safety, environmental compliance, and DBE commitment
- Oversight of schedule, cost accountability, and the establishment of management systems



**Lead Engineer**, Kenneth Wright, P.E.  
 + 32 Years Experience  
**FC: 100% | D: 100% | C: 100% | M: As Needed**

- Overall responsibility for Project design and compliance with applicable laws and standards
- Leads the design team and manages, oversees, and certifies that all design work is complete and conforms to all requirements of the PPA
- Ensures timely flow of design information and approves final design



**Safety Manager**, Edward Buffington, ASP, CHST  
 + 23 Years Experience  
**FC: 100% | D: 100% | C: 100% | M: As Needed**

- Responsible for developing, maintaining, and managing the Project-specific health and safety plan, including audits, inspection, training, and continuous improvement
- Leads the safety team and interfaces with production staff
- Responsible for subcontractor safety culture integration into PWKP's safety program



**Utility Manager**, Abdoul Diallo  
 + 17 Years Experience  
**FC: 75% | D: 100% | C: 100% | M: As Needed**

- Administers all utility relocations required for the Project, including coordination between the PWKP/utility owners/PennDOT
- Manages permanent service identification and protection



**Quality Manager**, Matt Semerad  
 + 16 Years Experience  
**FC: 100% | D: 100% | C: 100% | M: As Needed**

- Overall authority and responsibility for quality management system-related activities for all work, including the establishment, maintenance, and compliance with the QMP
- Ensures adherence to contractual specifications and approved design documents
- Prepares monthly quality reports and results of quality reviews, inspections, and tests performed



**Construction Quality Control Manager**, Ron Rogge, P.E.  
 + 33 Years Experience  
**FC: 75% | D: 100% | C: 100% | M: As Needed**

- Responsible for management of the construction work per the CQMP
- Ensures the methods/procedures in the CQMP are implemented and followed by PWKP and subcontractors
- Oversees construction quality control, surveillance, auditing, and continuous improvement



**Construction Quality Acceptance Manager**, Naji Chidiac, P.E.  
 + 26 Years Experience  
**FC: 75% | D: 100% | C: 100% | M: As Needed**

- Manages the quality acceptance aspect of the CQMP
- Responsible to review, approve, authorize, examine, and confirm any methods or procedures requiring the Engineers' review, approval authorization, examination, and confirmation
- Ensures all construction methods, materials, and submittals have been approved by the necessary parties prior to construction
- Ensures proper documentation for construction methods, materials, and submittals is compiled through the end of construction



**Design Quality Control Manager**, Daniel Domalik, P.E.  
 + 19 Years Experience  
**FC: 100% | D: 100% | C: 50% | M: As Needed**

- Manages the QC program for the design, environmental, ROW, utilities, and survey
- Leads design quality and interfaces with the Lead engineer and design staff to manage design quality compliance
- Ensures the methods/procedures contained in the DQMP are implemented and followed by PWKP design staff in the performance of work



**Quality Assurance Manager**, John Waugh, P.E.  
 + 28 Years Experience  
**FC: 75% | D: 100% | C: 100% | M: As Needed**

- Responsible for PWKP's quality assurance program that verifies the processes described in the QMP
- Ensures all quality requirements of the Project documents are met



**Public Information Coordinator**, Dan Galvin  
 + 23 Years Experience  
**FC: 15% | D: 100% | C: 100% | M: As Needed**

- Leads public relations efforts for PWKP
- Keeps public informed of Project status including work and all lane closures/restrictions
- Responsible for developing, reviewing, and implementing the Public Involvement Plan
- Maintains proactive communication with PennDOT and community stakeholders



**DBE Coordinator**, Marvin Jackson  
 + 16 Years Experience  
**FC: 50% | D: 75% | C: 100% | M: As Needed**

- Leads PWKP's activities ensuring all DBE requirements are achieved
- Responsible for outreach to DBE Firms, small businesses, and community groups
- Monitors progress toward achieving goals/compliance
- Maintains all reporting requirements, provides training, and coordinates mentoring efforts



**Environmental Compliance Manager**, Steve Wiedemer  
 + 27 Years Experience  
**FC: 100% | D: 100% | C: 100% | M: As Needed**

- Leads the environmental team
- Oversees environmental and sustainability issues during design and construction and ensures PWKP fulfills all permit obligations
- Adheres to all environmental laws and regulations for the performance of the Project

**LEGEND**

<b>FC:</b> Through Financial Close	 Development Entity
<b>D:</b> Design	 Construction
<b>C:</b> Construction	 Design
<b>M:</b> Maintenance	 Maintenance

**Quality Task Managers:** The quality management organization’s function is to ensure that all work meets contract standards and requirements through each phase of the Project. Sub-organizations will employ specialized Task Managers working under the respective quality key personnel with the following experience:

- » **Design Discipline Review Leads** – PE, experienced in bridge design for relevant discipline
- » **Document Control Lead** – Minimum 5 years design quality experience
- » **Materials Testing Leads** – Appropriate materials testing certification (ACI, NECEPT, etc.)
- » **Regional QC Manager** – Minimum 5 years construction quality experience
- » **Bridge Inspector** – PennDOT Bridge Safety Inspector Certification Course

**Public Information Staff:** Public information efforts will be managed by Public Information Coordinator, Dan Galvin. Dan has more than 20 years of experience on high profile design-build transportation projects and has implemented and managed communication programs over a broad range of geographic areas and stakeholder groups.

Dan will be assisted by Ceisler Media and Issue Advocacy (Ceisler) for all public information and community outreach efforts. Ceisler has a long history of similar experience throughout the state and will leverage this experience to tailor outreach efforts to the diverse set of individual communities surrounding each bridge site.

**Workload:** Each firm carefully evaluated its current workload, backlog, and work currently being pursued to ensure adequate capacity to design, construct and maintain all 558 structurally deficient bridges across the Commonwealth. Walsh, Granite, and HDR

**TABLE 4.1-1 PROJECTED WORKLOAD AND BACKLOG**

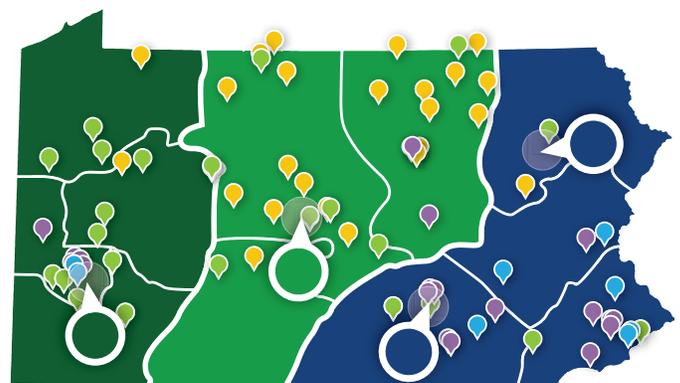
PARTICIPANT	2014 WORKLOAD	CURRENT BACKLOG
<b>WALSH GROUP</b>	\$4.8B	\$8.2B
<b>GRANITE CONSTRUCTION</b>	\$2.3B	\$2.5B
<b>HDR</b>	\$914M	\$36.5M
<b>THE WALSH GROUP, LTD., IS WALSH CONSTRUCTION'S PARENT COMPANY AND ITS D&amp;C GUARANTOR AND WALSH INFRASTRUCTURE MANAGEMENT'S GUARANTOR</b>		

manage their pursuit selection and current workload to minimize risk, never undertaking a contract without the proper resources to guarantee its absolute success. **Table 4.1-1** describes the major participants capacity during design, construction, and maintenance of the Project. Many of the PWKP team’s current projects will reach substantial completion in the coming year, allowing us to dedicate more resources to the Project as mobilization and construction of the new bridges begins in 2015.

**Resources:** PWKP will commit appropriate resources to successfully deliver all 558 bridges by December 31, 2017, including:

- » **Personnel:** PWKP’s Major Participants employ over 1,600 professionals and craft workers throughout Pennsylvania experienced in all aspects of bridge design and construction. Personnel are ready to mobilize.
- » **Equipment:** PWKP has a combined equipment fleet value of \$1.2 billion, and PWKP’s exclusive subcontractors own several equipment and staging yards throughout the state.
- » **Facilities:** PWKP’s Major Participants and subcontractors maintain numerous facilities throughout the state, including in all 11 PennDOT Districts, as shown in **Figure 4.1-4**.

**FIGURE 4.1-4 IDENTIFIED RESOURCE LOCATIONS**



**District Office Locations**

- 📍 Pittsburgh (West) 📍 State College (Central)
- 📍 Harrisburg (East), Scranton (East ECB Satellite)

**Local Resource Locations**

- 📍 PWKP Local Office Locations
- 📍 Exclusive Subconsultant Office Locations
- 📍 Exclusive Subcontractor Office Locations
- 📍 Exclusive Subcontractor Staging Yards and Production Facilities

## Internal Organization Systems Plan

**Unified Project Approach:** The Project’s structure requires a carefully planned approach to managing the numerous interfaces that will exist within the PWKP team members, which include Key Personnel, subcontractors, suppliers, and consultants. PWKP has established seven dedicated TWGs to facilitate the Project design, including:

TECHNICAL WORK GROUPS
<ul style="list-style-type: none"> <li>» Design Standardization</li> <li>» Geotechnical</li> <li>» Maintenance of Traffic</li> <li>» Hydraulics and Hydrology</li> <li>» Schedule</li> <li>» Permitting</li> <li>» Subcontracting/Logistics</li> </ul>

PWKP’s TWGs include design, construction, and maintenance personnel to provide input into constructability, life cycle, and durability concerns.

 Three regional offices will be established during the Construction and Maintenance Periods, each with a dedicated management team to lead field

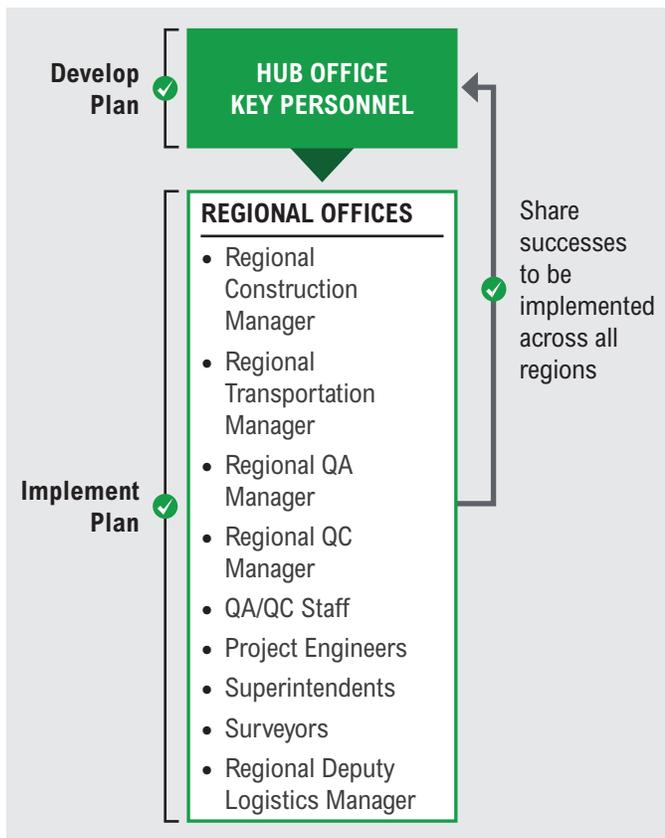
operations, and a fourth satellite office to manage Early Completion Bridges in 2015. Centralized decisions will be communicated from the hub office to Regional Construction Managers to ensure consistency in the delivery of the Project (**Figure 4.1-5**).

Regional staff will provide feedback to the Deputy Project Manager when issues and opportunities are encountered to facilitate continuous improvement of all aspects of construction. Regional key subcontractors will participate in TWG meetings to ensure that information is being shared to all team members.

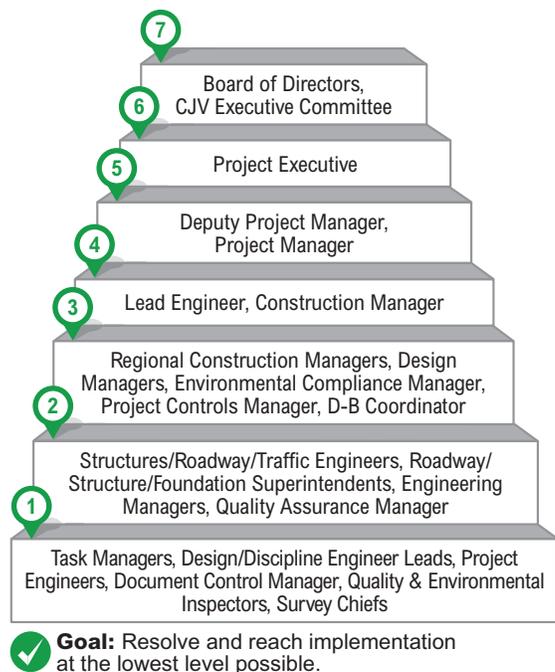
**Issue Resolution:** To facilitate a proactive approach to issue management, PWKP will hold an internal partnering session workshop for Project team members. The partnering session will outline an issue resolution process including individuals involved at each level of authority. PWKP will resolve issues, as shown in **Figure 4.1-6**, with the goal to resolve issues at the lowest possible level to minimize impact to the Project.

 PWKP will employ two internal oversight committees consisting of senior management personnel from Walsh, Granite, and HDR. The Construction Joint Venture (CJV) Executive Committee will provide all necessary oversight for design and construction operations and will have the authority to make high-level decisions for the CJV.

**FIGURE 4.1-5 REGIONAL OFFICE COORDINATION EFFORTS**



**FIGURE 4.1-6 PWKP’S ISSUE RESOLUTION PROCESS**



The Executive Committee will meet regularly to assess areas such as quality, safety, cost, schedule, and DBE compliance. Similarly, PWKP’s Board of Directors will consist of representatives of the equity partners, Plenary and Walsh Investors, to meet regularly to ensure all contractual obligations are being adhered to and design, construction, and maintenance operations are being carried out with consideration to long-term durability, performance, and quality of all Project assets. **Table 4.1-2** shows how PWKP will effectively communicate amongst all team members.



**Communications:** The majority of Key Personnel will be co-located to ensure effective communication throughout all levels of the organization.

The TWGs will provide a central authority for issues that are common to all bridge sites. To ensure swift and effective communication throughout the team and with the regional construction offices, TWG meetings will include personnel from sub-organizations including design, construction, maintenance, quality, safety,

and environmental. These individuals will be responsible for disseminating information developed at the TWG to the Task Leads operating at the regional level. They will also bring any concerns from the field management personnel back to the TWGs. This two-way flow of information is critical to the continuous improvement of the quality systems by allowing incorporation of issues and improvements encountered in the field into formal quality plan updates.



Design-Build Coordinator, Ben Boisvert, PE will facilitate communication and interfaces between TWGs, design disciplines, construction management, PennDOT, and PWKP Management.

**Interface with the Department:** The Project Executive will serve as the single point of accountability to PennDOT, and day to day interactions between PWKP and PennDOT will occur at several levels within both organizations. Communication will be fostered through Over the Shoulder Reviews and inclusion of PennDOT personnel at key Project meetings.

**TABLE 4.1-2 PROPOSED PWKP COORDINATION MEETINGS**

PWKP will continue working in its current capacity with regularly scheduled meetings amongst design, construction, maintenance, and PennDOT counterparts.

TYPE OF MEETING	SUGGESTED ATTENDEES	FREQUENCY
Technical Work Groups	» Design Discipline Leads, Construction Discipline Leads, DB Coordinator, Design & Construction Staff, Regional Construction Managers, QA/QC Staff, Maintenance Staff, PennDOT, Stakeholders (as needed)	Weekly, for each discipline
Over the Shoulder Reviews	» Lead Engineer, Design Discipline Leads, Deputy Project Manager, DB Coordinator, PennDOT	As Needed
Design Coordination	» Deputy Project Manager, Construction Manager, Lead Engineer, DB Coordinator, Construction Discipline Leads, Design discipline leads	Weekly, during design process
Daily Schedule, Quality, and Safety	» Foremen, Superintendents, Regional Project Management	Daily, during construction
Quality	» Quality Manager, QA Manager, Construction QC Manager, Design QC Manager, CQAM, Deputy Project Manager Construction Manager, PennDOT	Weekly
Project Status	» Deputy Project Manager, Construction Manager, Lead Engineer, PI Manager, Utility Coordination Lead, Subcontractors (as requested), PennDOT, QA/QC Managers	Weekly
Public Information (PI) Status	» PI Manager, PennDOT, Project Manager, and Stakeholders	Weekly
Schedule Status	» Deputy Project Manager, Lead Engineer, Construction Manager, PI Manager, Utility Coordination Lead, PennDOT, Project Scheduler	Monthly
Executive Management Review	» Executive Committee, Project Manager	Quarterly

PennDOT personnel will have real time access to all Project documentation through joint access to both the EDMS and MMIS systems.

**Government/Third Party Interfaces:** In order to ensure all quality standards are met, PWKP will set standards for all reporting and communication through all levels of the organization, including consultants and subcontractors. Forms including quality reports, three-week look-ahead schedules, and punchlists will be standardized across all 558 bridges. PennDOT will be encouraged to attend all applicable planning and progress meetings to provide input into standardization efforts.

PWKP will develop and foster relationships among all stakeholders through several targeted methods, outlined in **Table 4.1-3**, to allow for efficient communication and close partnering during all phases of the Project.

**Quality Process:** A clear and detailed organizational structure has been developed to manage the quality organization’s interfaces during the design, construction, and maintenance phases. All lines of reporting for quality organization personnel flow directly to the Project Manager at the DE level, parallel to, but independent of, all design, construction, and maintenance personnel.

Walsh performed concrete inspections and testing as part of a comprehensive quality control program on the Ohio River Bridge P3 Project.



As the DE is ultimately responsible for the performance of the replacement bridges throughout the Term and the quality of their condition at handback, such a structure ensures that the quality organization will operate autonomously from all cost and schedule concerns.

**TABLE 4.1-3 OPTIMIZE RELATIONSHIPS WITH AFFECTED PARTIES**

PWKP will leverage its existing relationships with PennDOT staff, cooperating agencies, and stakeholders, coordinating regular communication during all Project phases.

AGENCY OR THIRD PARTY	DESIGN	CONSTRUCTION	MAINTENANCE
<b>PENNDOT/CONSULTANTS</b>	<ul style="list-style-type: none"> <li>» PennDOT invited to attend key TWG meetings to provide early feedback prior to formal submission</li> </ul>	<ul style="list-style-type: none"> <li>» PennDOT provided access to EDMS</li> <li>» Weekly update meetings held at each regional office</li> </ul>	<ul style="list-style-type: none"> <li>» PennDOT provided regular asset assessments, bridge inspection reports, and access to the MMIS system</li> </ul>
<b>OTHER GOVERNMENTAL AGENCIES</b>	<ul style="list-style-type: none"> <li>» Permit pre-application workshop to develop: method of bundling of permits, anticipated submission schedule, and process for regular meetings/calls</li> </ul>	<ul style="list-style-type: none"> <li>» An environmental compliance matrix and report developed and maintained by PWKP's ECM to ensure all permit conditions are being met</li> </ul>	<ul style="list-style-type: none"> <li>» Single point of contact throughout the Maintenance Period</li> <li>» Formal transition process to ensure all agreements are carried forward to the Maintenance Period</li> </ul>
<b>LOCAL COMMUNITIES/BUSINESSES/EMERGENCY SERVICES</b>	<ul style="list-style-type: none"> <li>» The Public Information Coordinator obtains contact information for all known affected Customer Groups and develops a database to track PIC efforts.</li> </ul>	<ul style="list-style-type: none"> <li>» Customer Groups notified well in advance of traffic restrictions</li> <li>» A 24-hour telephone hotline number established and communicated.</li> </ul>	<ul style="list-style-type: none"> <li>» Maintenance operations scheduled to minimize public disruption</li> <li>» Customer Group contact database maintained and updated as necessary</li> </ul>

## PRELIMINARY DBE PERFORMANCE PLAN

PWKP pledges to achieve PennDOT’s DBE goal of 7% during the Design and Construction Periods and maintain good faith efforts during the Maintenance Period. PWKP has already begun to use its local knowledge and experience to identify and encourage available regional DBE subcontractors. PWKP will bid work packages in sizes that are manageable and favorable to DBE subcontractors and suppliers.

### Approach to Achieving All DBE Goals

**Comprehensive and Aggressive Approach:** PWKP’s approach will build on PennDOT’s approach to meeting Federal Highway Administration’s DBE goals as well as successful programs in the state, such as Associated Pennsylvania Constructor’s (APC) “Getting Ready for Primetime” Program. PWKP will aim to garner meaningful DBE participation in each of PennDOT’s applicable market categories.

PWKP, including its exclusive subcontractors, has offices and project experience throughout the state. Our strong working relationships with local subcontractors, and our continued efforts during the Proposal phase to forge new relationships, will help us reach the 7% goal.



#### Proactive Compliance Management:

PWKP’s DBE Coordinator, Marvin Jackson, has already begun outreach efforts to DBE firms. Marvin and key management from PWKP have conducted five open house events throughout the state regarding the Project, inviting over 3,200 DBE firms. Marvin will monitor and manage PWKP’s DBE compliance and training efforts, and ensure that DBE firms are performing commercially useful functions.

PWKP’s approach to DBE compliance will carry through all phases, with heightened commitments during the design and construction phase, as shown in **Figure 4.1–6**.



**MARVIN JACKSON**  
DBE COORDINATOR

#### QUALIFICATIONS:

- Developed and managed DBE plans for the \$860M Ohio River Bridge Downtown Crossing Design-Build P3 Project
- Exceeded M/W/DBE goals on the \$490M Dallas Area Rapid Transit LRT Expansion

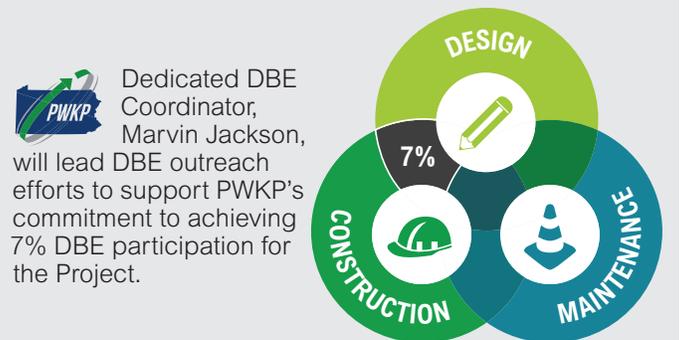
## Encouraging Current DBE Participation

PWKP developed a list of Pennsylvania-certified DBE firms, and firms eligible for certification, and performed outreach to these firms. PWKP has conducted five open house events across the Commonwealth during 2014. Invitations were distributed to 1,673 registered DBEs on the Pennsylvania Unified Certification Program (PA UCP) list and 1,713 registered DBEs in other states who may be eligible to become certified in Pennsylvania. Invitations also were sent to the following:

- » PA DBE Supportive Services
- » Allegheny County MWDBE Organization
- » Women Entrepreneurs of Chatham
- » PA Hispanic Chamber of Commerce
- » The Kingsley Association

### FIGURE 4.1–6 PWKP DBE COMPLIANCE PLAN

PWKP’s comprehensive approach to DBE compliance will carry through all phases, primarily during construction.



 Dedicated DBE Coordinator, Marvin Jackson, will lead DBE outreach efforts to support PWKP’s commitment to achieving 7% DBE participation for the Project.

#### DESIGN

- DBE open house events and outreach to organizations including PAUCP
- DBE progress reporting to PennDOT and PWKP Executive Management
- Proactive outreach and community engagement
- DBE involvement in Technical Work Groups
- DBE participation in PennDOT categories

#### CONSTRUCTION

- Packaged work scopes
- DBE progress reporting to PennDOT and PWKP Executive Management
- Selection of DBE participating subcontractors to manage bridge replacements
- Proactive outreach and community engagement
- Required DBE participation from participating subcontractors

#### MAINTENANCE

- Localized DBE support during construction
- Efforts for meaningful DBE participation

 **EXCEEDING PENNDOT'S EXPECTATIONS**

PWKP's DBE Coordinator, Marvin Jackson, speaks to a group of registered DBE Firms at one of five open house events hosted by PWKP throughout Pennsylvania.



The Open House events provided attendees:

- » Information about the program, including anticipated commercially useful functions
- » One-on-one time to ask questions and network with PWKP management staff
- » A point-of-contact to answer any questions regarding certification, bidding, and contract awards throughout the proposal process.

PWKP will continue to use many of the same outreach methods that PennDOT has identified for effective DBE outreach, including:

- » PennDOT's DBE Supportive Services Center
- » program in conjunction with Cheyney University
- » PA UCP and all adjacent states' organizations,
- » Community based/faith based groups
- » Newspapers, such as the Pennsylvania Bulletin
- » Minority trade publications

Through due diligence during the pursuit, PWKP has identified scopes of work that are expected to be performed, at least partially, by DBE firms (**Table 4.1-4**).

### Race-Neutral Approach

The PWKP race-neutral approach is consistent with PennDOT's goals for race-neutral goal attainment. PWKP will encourage and assist all small businesses for participation in this contract, as opposed to singularly engaging DBEs. PWKP will track and report to PennDOT the race-neutral vs. race-conscious goal apportionment and make appropriate adjustments.

### Encouraging Potential DBE Firm Participation

PWKP has identified non-certified DBE firms who are interested and eligible to apply for certification. PWKP's DBE Coordinator has conducted outreach to PA UCP and adjacent states' organizations to

encourage participation at our Open House events and offer assistance to firms who are seeking DBE certification.

Marvin will continue to provide assistance in the following ways:

- » Invite all small business, minority, women, and veteran-owned firms to attend events
- » Have applications onsite at events
- » Provide information on certification procedures

### Mentoring, Training, and Assistance

PWKP will provide a formal mentoring program for protégé firms whose participation on the team is expected to last at least two years. This program will be specific to the protégé firms' scope of work and will promote growth in the Pennsylvania economy.

In addition to the formal mentoring program, which is targeted to a specific scope of work, we will provide comprehensive mentorship for DBE General Contractors including training for bridge replacement construction and Project management. PWKP will also encourage DBE subcontractors to participate in:

- » DBE Supportive Services Workshops (PennDOT in conjunction with Cheyney University)
- » APC's mentoring program

**TABLE 4.1-4 PWKP'S DBE PARTICIPATION SCHEDULE**

 ITEMS OF WORK » EXPECTED % DBE PARTICIPATION	
Precast Beams	» 3.05%
Structural Steel	» 1.91%
Box Culverts	» 0.42%
Trucking	» 0.17%
Traffic Control	» 0.22%
Pavement Markings	» 0.04%
Guiderail	» 0.13%
Fencing	» 0.01%
Landscaping	» 0.06%
Clearing & Grubbing	» 0.06%
Design Engineering	» 0.93%
<b>TOTAL » 7.00%</b>	

## PRELIMINARY COMPREHENSIVE ENVIRONMENTAL PROTECTION PLAN

### Commitment to NEPA

PWKP recognizes the importance of protecting the environment and complying with all applicable laws, rules, and regulations, as per the NEPA process. PWKP will respect and comply with all NEPA commitments throughout the Project Term.

### Environmental Compliance Team (ECT)

PWKP’s Environmental Compliance Manager, Stephen Wiedemer, AICP, leads the environmental team bringing 26 years of experience managing environmental matters for transportation projects. Steve will be responsible for all environmental matters including sustainability during design and construction. He will ensure PWKP fulfills all permit obligations and adheres to all environmental laws and regulations for the Project. Stephen will be supported by A.D. Marble & Company, which has extensive experience conducting environmental studies, preparing BRPAs and CEEs and permits for over 900 bridges in Pennsylvania.

### Bridge Type Compliance Benefits

PWKP will consider all applicable NEPA and governmental requirements in the bridge type selection at each site, seen in **Table 4.1-5**. Our designers and environmental team will work closely together to avoid and minimize impacts. PWKP will also develop environmental performance standards to be incorporated into bridge type selection. Considerations at each bridge site will include but is not limited to:



### PWKP’S ENVIRONMENTAL TEAM

#### STEPHEN WIEDEMER, AICP

- 26 years of experience providing environmental management for transportation projects
- Experience serving as the Environmental Manager for PennDOT District 12-0
- Extensive experience conducting studies and preparing environmental documents, including NEPA documents

#### A.D. MARBLE & COMPANY

- Recipient of the Greater Valley Forge Transportation’s 2011 Annual Sustainable Award
- Recipient of multiple Platinum LEED certifications for numerous sustainable initiatives
- Utilize an in-house interdisciplinary approach, environmental scientists, cultural resource specialists, and water resource engineers to effectively obtain environmental clearances and to obtain the necessary permits

- » Limit widening to 12 feet or less on each side of the replacement bridge where applicable
- » Minimize wetland impacts to de minimus threshold when possible
- » Maintain lateral connectivity between stream and floodplain
- » Limits impacts to streams
- » Limit disturbance to less than 12 feet from existing bridge slopes where applicable to reduce archaeological study requirements

**TABLE 4.1-5 VARIOUS BRIDGE TYPE COMPLIANCE BENEFITS**

PWKP’s bridge type selection addresses all environmental considerations at each bridge site.

PWKP BENEFIT	BOX CULVERT	ADJACENT BOX BEAMS	SPREAD BOX BEAMS	BULB-T BEAMS	STEEL BEAMS
Compatible with integral abutments to reduce in-water work during construction			✓	✓	✓
Compatible with staged construction methods	✓	✓	✓	✓	✓
Compatible with spans over 100’ to eliminate bridge piers in streams		✓	✓	✓	✓
Compatible with Accelerated Bridge Construction techniques to minimize the duration of impacts	✓	✓	✓	✓	✓
Provides increased hydraulic efficiency and reduced superstructure depth	✓	✓	✓		✓

## Comprehensive Environmental Protection Plan (CEPP)

PWKP will create a Comprehensive Environmental Protection Plan (CEPP) that will ensure design, construction, and maintenance of each bridge will be handled in an environmentally sensitive manner that meets the mitigation commitments, permit conditions, and applicable laws and regulations. The CEPP will describe the processes that will be followed to comply with the environmental approvals, commitments, permit conditions, and requirements. PWKP’s approach to ensuring environmental compliance includes the components shown in **Table 4.1-6**.

PWKP will conduct a quarterly review of the CEPP to ensure that it is up to date with respect to changes in environmental requirements and conditions. Any changes or amendments to the CEPP will be in accordance with the Project Management Plan.

### Environmental Obligations for Maintenance

Prior to commencement of the maintenance period, WIM will review the applicable environmental restrictions and commitments for each bridge site to review environmental requirements that will impact maintenance activities.

This review will serve to establish a baseline for maintenance activities at each bridge related to environmental concerns. The rolling nature of the commencement of the maintenance periods allows maintenance staff direct access to the environmental personnel as each bridge transitions to the Maintenance Period.

After construction work is complete, responsibility for maintenance of the ECMTS will transfer to the Maintenance Manager. From the end of construction activities through the remainder of the term, the Environmental Compliance Manager will be available on an as-needed basis to consult with the maintenance team to periodically review environmental compliance.

### Environmental Commitments and Documentation

Agency coordination during the NEPA evaluation process will detail all necessary environmental commitments and mitigation activities. Commitments and mitigations may include, but are not limited to:

**TABLE 4.1-6 PWKP’S COMPREHENSIVE ENVIRONMENTAL PROTECTION PLAN**

ENVIRONMENTAL COMMITMENT AND MITIGATION TRACKING SYSTEM (ECMTS)
The ECMTS details the environmental and mitigation commitments resulting from the NEPA process, permitting, and agency coordination. These commitments will be documented and input into ECMTS for each bridge Project and will include a matrix and plan of the resources of concern at each bridge.
ENVIRONMENTAL TRAINING PLAN (ETP)
The development and implementation of the ETP will provide environmental compliance training and education to personnel involved in construction and maintenance and recognition of environmental sensitivities associated with each bridge site.
WASTE MANAGEMENT PLAN (WMP)
The WMP will define proper handling, disposal, and documentation for all hazardous and non-hazardous waste encountered on the Project. The plan will include all material Safety Data Sheets (SDS), as well as spill response plans and contact information for all responsible individuals.
COMMUNICATION PLAN
The communication plan will establish strategies and procedures for communicating between the ECM, the ECT, the design & construction team, and PennDOT. The plan will include emergency contacts and identify the routes of communication with the team.
CONSTRUCTION MONITORING PLAN (CMP)
In accordance with the CQMP, the ECT will monitor the construction activities including sensitive environmental areas on a weekly basis to ensure compliance with the ECMTS. The components of the CMP are:
<ul style="list-style-type: none"> <li>» Organization and responsibilities for communication and monitoring</li> <li>» Protocols and methodologies for monitoring</li> <li>» Procedures and requirements for reporting</li> <li>» Notification and documentation procedures</li> <li>» Protocols and procedures for corrective actions and mitigation</li> </ul>

- » Fencing to avoid sensitive areas that were not directly impacted by the Project (T&E species locations, wetlands etc.)
- » Seasonal restrictions for trout waters
- » Developing a construction plan to avoid inadvertent damage to adjacent historic properties
- » Tree cutting restrictions for T&E bat species
- » Restoring temporarily disturbed wetlands
- » Reseeding disturbed vegetative areas



## HANDS ON APPROACH

PWKP performed physical site visits at each replacement bridge and compiled an eight page inspection report to assess the current structure and surrounding environment to develop an efficient preliminary design and permitting approach.

**Permits:** Permits for the bridges will depend on the environmental constraints at each bridge. The primary permit types for the Project will include the following:

- » PaDEP GP-11/PAGPSP-4 Category I
- » Non GP-11 will have a Joint Chapter 105/Section 404 permit application
- » NPDES may include General or Individual permits.

**Documentation and Reevaluation:** Documentation and reevaluation for the Project will include: the NEPA document, supporting technical documents for the environmental studies, agency meeting minutes, the ECMTS matrix and accompanying plan, permit applications, mitigation plans, and monitoring reports. Potential reevaluations of the NEPA document will occur if there are significant changes in the proposed action, the affected environment, the impacts, mitigation, or when a major authorization for the Project is required.

### Mitigating and Eliminating Risks



PWKP will collaborate as a team so the designers, environmental personnel, and contractors collaborate early and throughout the NEPA and permitting process to minimize up front the potential for environmental risk. To minimize risk, environmental performance standards will be developed early in the Project for the designer and contractor to use as guidelines. PWKP has identified key issues that could impact schedules due to the type of resource impacted and agency review comments, shown in **Table 4.1-7**.

### Compliance with the ECMTS

The ECMTS system will be utilized for the Term of the Project to ensure compliance. The ECM will ultimately be responsible to track compliance with all commitments as the Project progresses. The system developed will be structured such that the construction QC/QA staff are notified of all commitments at each

**TABLE 4.1-7 IDENTIFIED ENVIRONMENTAL RISKS & MITIGATION MEASURES**

SECTION 106 ISSUES
<ul style="list-style-type: none"> <li>» Early coordination with the Pennsylvania Historical and Museum Commission (PHMC)</li> <li>» Standard Project Finding Form for all bridges</li> </ul>
ARCHAEOLOGICAL RESOURCES THAT ARE AVOIDED DUE TO THE PROGRAMMATIC EXEMPTION ARE IMPACTED DURING CONSTRUCTION
<ul style="list-style-type: none"> <li>» Ongoing coordination and monitoring during construction</li> <li>» Archeologists available to evaluate any issue and determine the course of action</li> <li>» If necessary, cursory Phase I identification level field studies will be conducted to verify resource</li> </ul>
PERMIT/AGENCY ACTIONS DELAYED OR REVIEW EXTENSION
<ul style="list-style-type: none"> <li>» Initial kickoff meeting with all agencies, with the PaDEP regional offices to facilitate document review and permit processing</li> <li>» Pre-application field meetings to assist in expediting the permit review process</li> </ul>
ENCROACHMENT ON WATERWAYS AND WETLANDS WITH NEW FILLS
<ul style="list-style-type: none"> <li>» Adjust structure design to minimize fills near streams (exchanging structure types or foundation types to minimize impacts)</li> </ul>
SEASONAL FIELD STUDY RESTRICTIONS FOR THREATENED AND ENDANGERED (T&E) SPECIES
<ul style="list-style-type: none"> <li>» Early coordination with agencies for specific T&amp;E species to determine presence and survey times that can be incorporated early into the schedule for NEPA clearance</li> </ul>
SOIL AND GROUNDWATER CONTAMINATION FROM ADJACENT PROPERTIES DURING CONSTRUCTION
<ul style="list-style-type: none"> <li>» Hazardous Waste Management Plan and special provision compliance</li> </ul>
TIME OF YEAR LIMITATIONS ON WORK
<ul style="list-style-type: none"> <li>» Schedule sites that have time of year restrictions, such as wild trout streams and Approved Trout Waters</li> </ul>

site, assuring they are followed in construction. The ECM will assist in the transition from construction to maintenance periods and will transfer responsibility of the ECMTS to the Maintenance Manager upon final acceptance of all bridge structures.

# PRELIMINARY DOCUMENT AND DATA MANAGEMENT PLAN

## Electronic Document Management

PWKP proposes Microsoft’s SharePoint 2013 as the foundation of the Electronic Data Management System (EDMS), shown in **Figure 4.1-6**. The EDMS incorporates three areas of functionality in one system, accessible via direct server access or Web gateway:

**Collaboration:** Allows a streamlined approach for team members to share information and work together without the need of file shares or email programs.

**Search:** Using Optical Character Recognition, text, and meta-data enables users to quickly find content stored in lists, document libraries, and other data locations within the system directories according to security profiles that limit levels of access.

**Content Management:** Organization and control of documents and other data, including version history, security, auditing, and approvals.



Additionally, all design files will be maintained on an HDR ProjectWise server. ProjectWise has proven to be a valuable method of filing and tracking electronic files on large design-build and P3 projects for many years such as HDR’s recent usage of

ProjectWise for the Tappan Zee Bridge Replacement. ProjectWise integrates with Sharepoint, and any team member can access ProjectWise. Security can be maintained, as permissions are granted to specific individuals based on their roles on the Project.

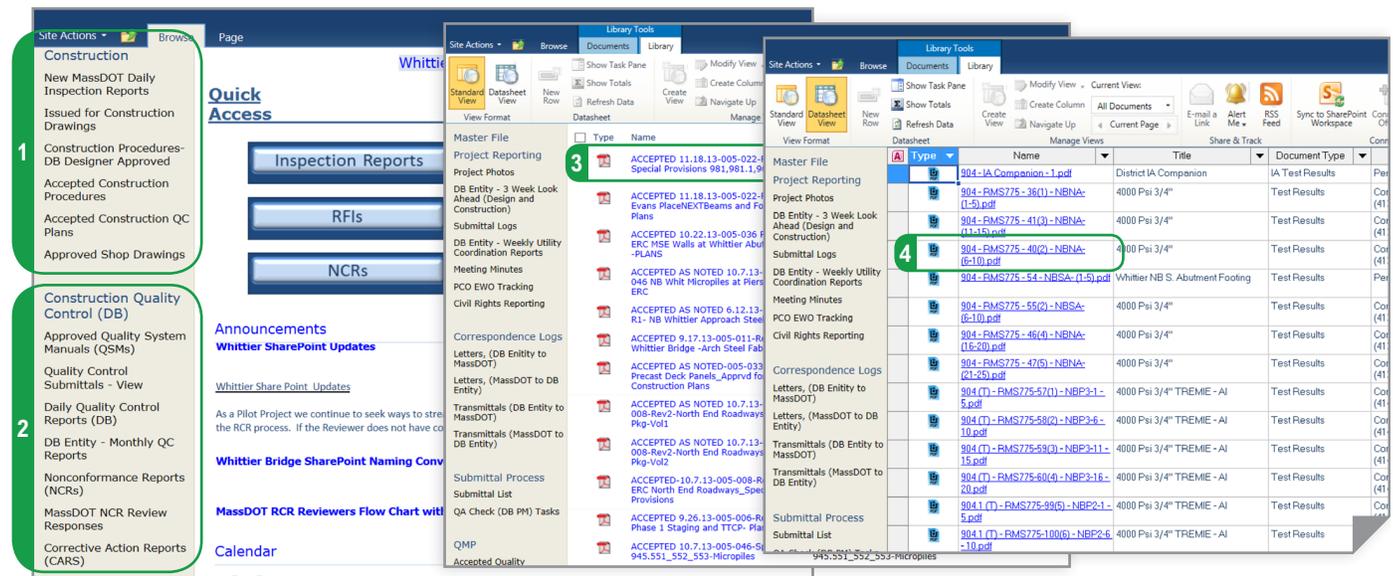
## EDMS and Maintenance Management Information System (MMIS)

SharePoint file storage meets all of the requirements of Section 2.1.3 of the TP. Files will be available to PennDOT personnel via a simple internet login. Files will be backed up on a nightly basis in two geographically separate, secure locations, as required. SharePoint will easily incorporate PennDOT’s Data Management System with access to PennDOT’s document control Application Programming Interface.

PWKP’s MMIS has the necessary functionality to meet the requirements in TP Section 17.3. Its capabilities include detailed asset inventory; asset history; access to design and construction data stored in the EDMS; work scheduling; reporting progress by activity or asset; inspection forms; tracking and reporting noncompliance; remote access to users; real-time data view; GIS functionality; and spare parts inventory management. The MMIS will be implemented prior to Substantial Completion of the first Replacement Bridge.

**FIGURE 4.1-6 PWKP’S ELECTRONIC DATA MANAGEMENT SYSTEM**

Sharepoint is successfully being utilized at the Whittier Bridge Design-Build Project in Massachusetts as the electronic data management system.



- 1 Construction Functions
- 2 Construction Quality Control
- 3 Plan Library
- 4 QC Test Results

## Electronic Format

All electronic files will be maintained in SharePoint in a searchable .PDF or native Microsoft file format. The SharePoint folder structure will have defined folders for all components of the Project. This is an efficient and sustainable method of record keeping that allows for portability of information, with access from virtually any device with internet access.

Basic files can be accessed in read-only form by various subcontractors as needed to be certain that the latest information is being used for all work. PWKP staff and subcontractors can upload Project files into an organized filing structure according to PennDOT’s specified naming conventions. By maintaining the original design files in ProjectWise, any changes or reassessment of designs required during construction can be handled efficiently by HDR.

## Security and Backup

The SharePoint EDMS will be hosted in Microsoft’s Office 365 Enterprise Cloud with distributed, redundant backups regionally hosted for quick access. The benefit of hosting in Microsoft’s Cloud include security and integrity of the Project data which will implemented with primary measures:

**Permissions:** Access to EDMS file libraries and content will be aggregated across the Project and User spectrum to ensure access rights are aligned with business needs.

**EDMS:** Activity will be monitored to assure compliance to security protocols and access control lists.

**Microsoft’s Cloud service:** Includes network level security features to protect data; port scanning and remediation; perimeter vulnerability scanning; operating system security patching; network-level DDOS (distributed denial-of-service) detection and prevention; and multi-factor authentication for service access.

**Standards:** Office 365 follow industry cryptographic standards to protect confidentiality and integrity of data.

## Integrating with Department EDMS

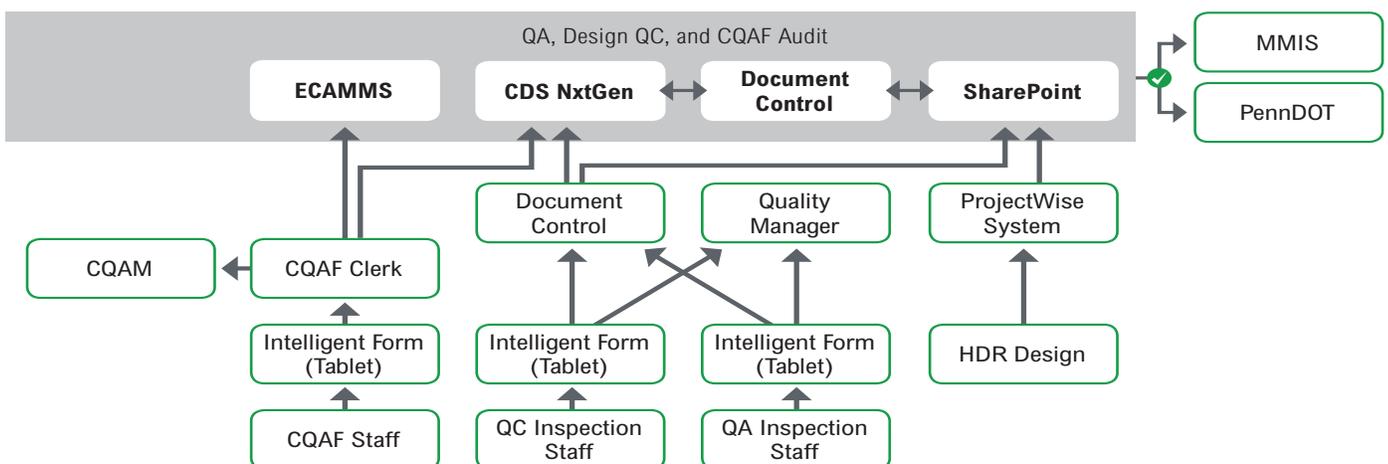
The Project EDMS system will leverage a variety of custom and off-the-shelf applications such as ProjectWise, P6 Scheduler, and Proprietary QC software which will integrate directly into the Project’s SharePoint. PWKP intends to integrate with PennDOT’s current systems through the use of an efficient internal EDMS in conjunction with experienced document control staff facilitating the movement of information between internal systems as demonstrated in **Figure 4.1-7**.

## Data Transfer to the Department



File transfer to PennDOT can be easily performed to PennDOT’s preferred web-based storage medium. PWKP anticipates that technology will be significantly different at the end of the term, and will therefore work together with PennDOT to determine the most feasible solution to transferring and storing files for PennDOT’s use after handback.

**FIGURE 4.1-7 PWKP’S ELECTRONIC DATA MANAGEMENT SYSTEM**



## RISK MANAGEMENT

### Approach to Project Specific Risks



On the following page, **Table 4.1-8** illustrates the procedure and risk register used by PWKP to perform analysis of identified risks.

**Before Mitigation:** Starting at the left, general categories with associated specific risks are identified, assessed to their potential effect on cost & schedule, and evaluated based on their respective probability and severity to arrive at an initial risk rating.

**Mitigation Actions:** Once assessed, the initial ratings will be reviewed in accordance with applicable mitigation strategies and control measures. For example, PWKP will conduct additional borings at bridge locations where either the provided information is conflicted or was insufficient to evaluate the geotechnical conditions.

**After Mitigation:** After implementation, results are re-evaluated and the process continues until acceptable risk levels are attained.

The risk management process must be maintained, re-analyzed, re-evaluated, and updated periodically. PWKP will use proven risk management tools such as **Design Analysis Resolution Team (DART)** and **After Action Reviews** by the CJV Design Coordinators and HDR management team during the design process. Utilization of DART will enable the D&C team to evaluate individual design issues as they occur and include those with merit immediately into the bridge design. Conducting periodic After Action Reviews at specified points in the schedule will ensure that both knowledge of positive improvements and lessons learned will be shared by all member of the D&C team.

### Document, Cost Control, and Schedule Management System

With the integration of a resource loaded Baseline Schedule with the Project Document Control network PWKP has the ability to monitor the overall progress of the program. Reviews of this information will be conducted weekly at various TWG meetings. Weekly TWG evaluations will enable the PWKP D&C Team to make real time adjustments based on data from all aspects of the Project and incorporate them early



### PROCEDURES TO ENSURE PWKP MEETS PENNDOT'S GOALS

To develop effective risk mitigation strategies, each of PWKP's Technical Work Groups analyzed risks related to their specific area and developed mitigation strategies as they developed their respective scopes of work. PWKP approach included:

- Identification of potential risk categories by bridge through bridge inspections
- Assessment of risk category significance
- Control measure assignment
- Evaluation and mitigation with additional controls where appropriate

for maximum positive impact. Subsequently program wide reviews and evaluations will be performed on a scheduled basis so that the progress of and improvements to the overall Project can be made, documented and shared with all members of the PWKP team and PennDOT.

Plenary utilized a similar risk register to identify and mitigate risks for the US 36 Managed Lanes Project.

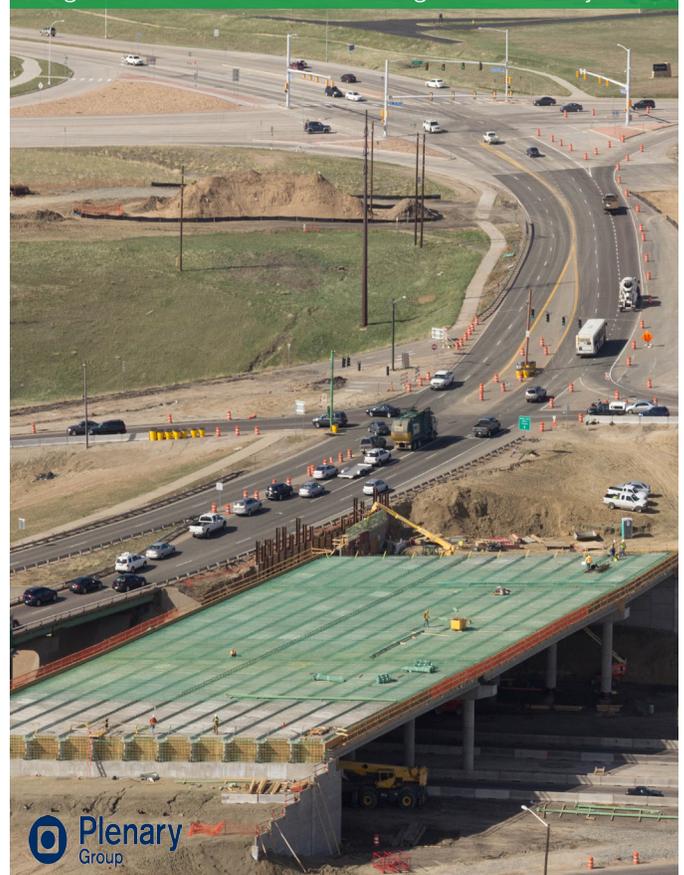


TABLE 4.1-8 PWKP RISK REGISTER WITH BEFORE AND AFTER RISK RATINGS

Category	Description	Potential Cost Impacts	Potential Schedule Impacts	BEFORE MITIGATION			Mitigation Actions/Comments	Probability (P)					AFTER MITIGATION		
				PROBABILITY (P)	SEVERITY (S)	RISK RATING (P X S)		1	2	3	4	5	PROBABILITY (P)	SEVERITY (S)	RISK RATING (P X S)
								Severity (S)	1	2	3	4			
Financial	Delay to Commercial or Financial Close	Low	High	1	3	3	Identify issues with Rating Agencies early. Utilize Plenary/Walsh Investors experience in P3 marketplace to reach financial close.	1	2	3	4	5	1	2	2
NEPA & Permitting	Delays from Governmental Approvals	Low	High	2	3	6	Prioritize BRPA & GP-11 bridge sites during schedule development. Local proven experience of PWKP Design Team. Develop backup bridge alternates with PennDOT.	1	2	3	4	5	2	2	4
ROW Acquisitions	Right of Way not Available When Needed	Low	Very High	3	4	12	Maximize ROW applications by early start with extensive effort by proven ROW agents while minimizing ROW takes.	1	2	3	4	5	3	3	9
Utility Relocation	Utilities Not Relocated or Protected When Needed	Low	Very High	3	5	15	PWKP will use the utility information collected during its bridge inspection program and maximize early utility relocations.	1	2	3	4	5	3	3	9
Hydraulic Issues	Scope Growth from Actual Survey & Models	High	Medium	4	4	16	Utilize RID data with actual field survey & H&H modeling within the guidance of the technical provisions to resolve issues. Eliminate piers and correct skews to improve hydraulic efficiency.	1	2	3	4	5	2	3	6
Design Schedule	Excessive or Repetitive Reviews	Low	Medium	2	4	8	Utilize proven experience of PWKP Design Team to develop Project design standards, procedures & design review timelines. Standardize and bundle submissions.	1	2	3	4	5	2	2	4
Roadway Improvements	Excessive Roadway Construction Limits	Very High	Medium	3	3	9	Develop adaptable Project design standards, procedures & design exceptions for multiple applications across 558 Bridge locations.	1	2	3	4	5	2	3	6
Geotechnical	Differing Site Conditions	Low	Low	2	4	8	Reduce severity by conducting additional borings at questionable bridge sites to establish greater certainty of rock elevation.	1	2	3	4	5	2	2	4
Traffic Management	Impact on Public	Low	Medium	3	2	6	PWKP will combine the traffic data obtained through its bridge inspection program with PennDOT's RID & NBIS detour routes. Evaluate all second order effects of roadway closures.	1	2	3	4	5	2	2	4
Material Procurement	Excessive Demand on Approved Suppliers	Medium	Medium	2	4	8	Early development of bill of materials will enable PWKP to complete major materials procurement by December 2015, reducing escalation risk.	1	2	3	4	5	2	2	4
Inflation	Increases Construction & Maintenance Periods	Very Low	None	1	2	2	Utilize financial strengths of all PWKP partners, contractors and designers to minimize impacts.	1	2	3	4	5	1	2	2
Logistics	Project Delays and Q/C Impacts	Low	Medium	3	3	9	Utilize Project wide logistical team to coordinate bridge deliveries.	1	2	3	4	5	2	3	6
Hazardous Materials	Delays Due to Discovery of Hazardous Materials	Low	Low	1	2	2	PWKP will build upon the HazMat data obtained through its bridge inspection program and continue the process through construction.	1	2	3	4	5	1	2	2
Sub GC's	Increased Demand on Existing Bridge Builders	Medium	Medium	3	4	12	Complete Sub GC contract procurement process by March 2017. Bundle bridge lettings to increase cost efficiency.	1	2	3	4	5	2	3	6
Specialty Subcontractors	Increased Demand in Heavy Civil Industry	Medium	Medium	2	3	6	Early development of bridge work scope will enable PWKP to get subcontractor involvement by December 2015. Agreements in place with Key Exclusive Subcontractors prior to Project award.	1	2	3	4	5	2	3	6
Maintenance	Unexpected Maintenance Requirements	Low	Low	1	4	4	Aggressive QA/QC initiative in design & construction phase with pro-active maintenance program emphasizing preventive measures. Leverage vertical integration of the Walsh Group across developer, contractor and maintenance roles.	1	2	3	4	5	1	3	3

## PRELIMINARY PROJECT BASELINE SCHEDULE (PPBS)

 **EXCEEDING PENNDOT'S SCHEDULE EXPECTATIONS**

PWKP's Preliminary Project Baseline Schedule will substantially complete all bridge replacements **eight months early, by December 31, 2017.**

### Overall Schedule Approach

PWKP's approach is to substantially complete all 558 bridges by the end of 2017, eight months prior to the substantial Project completion deadline of August 30, 2018. The accelerated plan will maximize resources while lowering construction and financing costs, resulting in the most efficient and economical execution of the Project. PWKP's three region set-up will allow for resources to be evenly distributed and closely managed across the Project's 558 bridge sites.

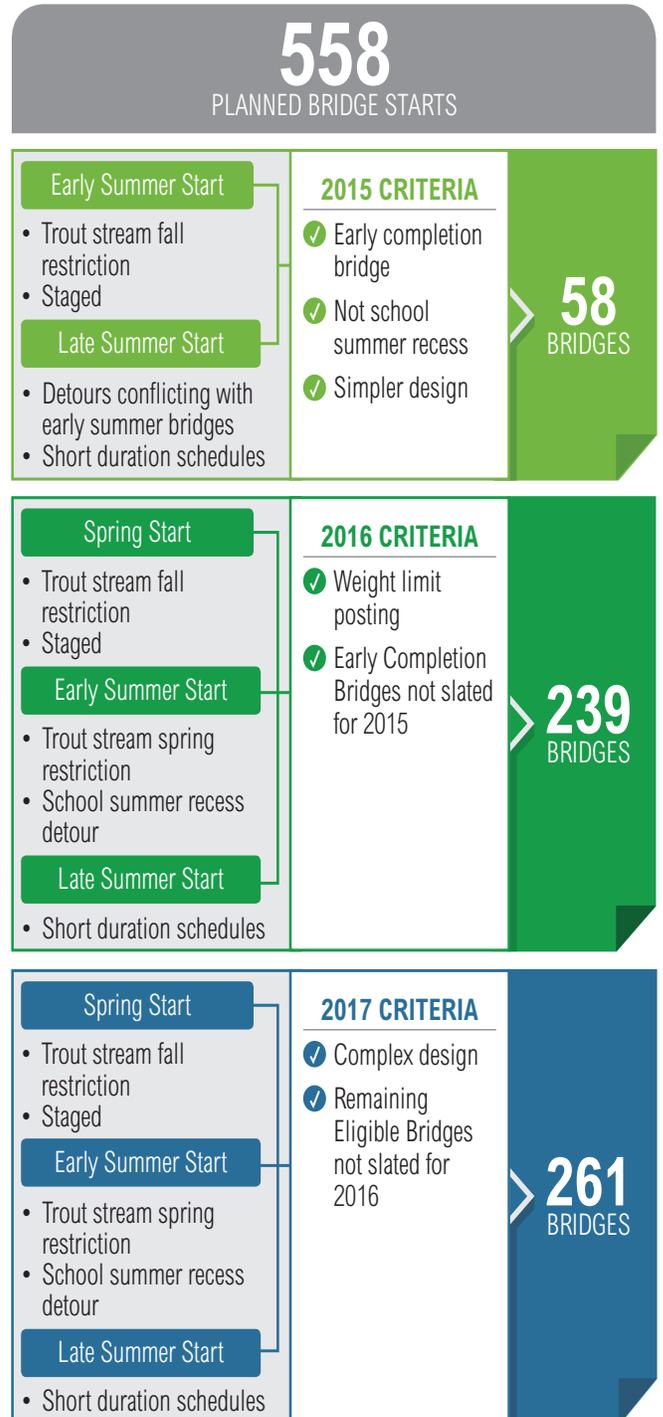
The approach used in the PPBS will keep the quantity of bridges under design or construction reasonably equal at all times within each region. This ensures that resources, such as design staff, construction managers, CQAF personnel, subcontractor resources, equipment, etc. allocated by region can stay in their respective regions for consistency. **Figure 4.1-8** shows the basic elements of the selection process used to determine the best time to schedule a bridge reconstruction during the Project. Once the basic schedule timeframe was determined, the timeframe was checked against restrictions caused by other bridge reconstruction sites, TP Attachment 10-1 restrictions, and adjustments were made as needed.

 PWKP has developed quantity and manpower curves (graphs) in order to manage the work and understand the challenges involved with construction on both a state-wide and single-bridge level. For example, PWKP has already forecasted concrete quantities by geographic location by year using the PPBS. As the Project progresses, this type of analysis will be done on a regular basis to assure that the Project stays on schedule and that the resources are available.

### Strategies to Manage the Schedule

PWKP realizes that unforeseen circumstances will arise that will impact the schedule. The strategy for recovery

**FIGURE 4.1-8 APPROACH TO BRIDGE SCHEDULE**



will be to use available methods to regain schedule days. Delays during the design phase will be mitigated by ensuring that the design process is well ahead of construction and additional bridges that have achieved NTP3 can take the scheduled place of those bridges encountering unforeseen delays in the design phase.

### THE FOLLOWING SCHEDULE ITEMS CAN BE FOUND IN THE APPENDIX TO VOLUME 2:

- » PWKP's complete PPBS is contained on the flashdrive
- » A schedule of anticipated substantial completion dates of each replacement bridge
- » A summary level PPBS with corresponding descriptive narrative
- » A narrative which describes the proposed execution of the work for the Term

## Summary Level Preliminary Baseline Project Schedule

PWKP has developed a resource based PPBS, and after Project award it will be reviewed with PennDOT and other affected agencies to seek their input. A detailed preconstruction schedule for each bridge shows the interrelation and timing of Governmental Approvals, ROW acquisitions, utility adjustments, and design. All of these items are on the critical path to obtaining NTP3 for each bridge. The PPBS utilizes a detailed construction schedule for each bridge with standard schedule sequences for 2-week, 5-week, 75 day, 110 day, culvert, and staged construction. The anticipated date for entire Project completion is December 31, 2017.

## Preparing, Controlling, and Updating Baseline Schedule

The thorough research already devoted to developing the PPBS will segue into the approach for preparing the Project Baseline Schedule. The PPBS includes significant detail and has already accounted for the mandatory Project requirements and restrictions. The schedule will be refined to expand the standard sequences into site specific schedules for each bridge. Adjustments will be made to coordinate construction schedules of bridges that are planned to be packaged together into a bid package for subcontractors.

Initial responsibility for the control and monthly update of the Project Baseline Schedule will start at PWKP's regional offices. Each regional office will have a scheduler who will be responsible for updating that region's progress and performing minor logic changes. Major logic changes having an impact on the entire Project or involving financial changes will be performed by the Project Scheduler. The Project Scheduler will be responsible for determining

performance on a monthly basis, submitting schedule updates, preparing and submitting payment requests, answering PennDOT's questions, and coordinating of the schedule between the three regions.

## Controlling Schedule Performance of Subcontractors

PWKP will ensure that subcontractors do not take on more work than their resources allow. A complete database of bid results for bridge replacement packages will be maintained and subcontractors' available resources will be verified prior to awarding work. PennDOT's regular bid results along with those of other agencies and state DOTs will also be monitored.

PWKP field staff will closely monitor subcontractor operations on a daily basis, and will report to regional management when problems like schedule delays arise. Documentation of the progress by subcontractors and vendors will be stored within the EDMS in addition to the monthly updates of the Project Schedule. Progress reports, both individual bridge and program wide, will be available to continuously monitor actual versus planned progress, so that adjustments can be made before complications become large problems.

## Managing Resources to Achieve Schedule

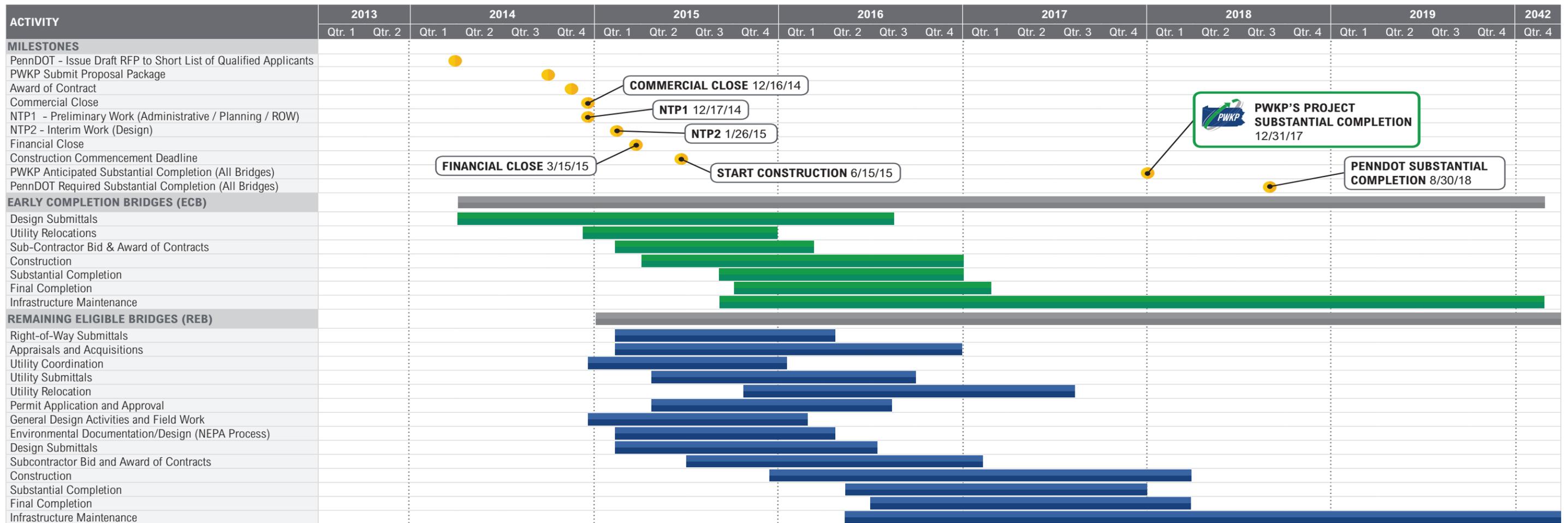
PWKP's three region setup turns one large Project into three smaller Projects, making resource management an easier task. Each region will manage its own resources, including subcontractors and their associated resources. The hub office will ensure that each region receives the required support and oversight through preconstruction activities including procuring subcontracts. PWKP will ensure that the number of bridges with completed design, fabrication, and subcontract awarding is well ahead of the quantity planned to start construction so that contingency plans and sufficient work locations are always available to offset schedule slippage at problematic bridges.



### ANALYZED FACTORS TO SUCCESSFULLY COMPLETE THE PROJECT

PWKP analyzed each bridge to determine the best time to construct based on factors including design complexity, right-of-way, utilities, permitting, environmental constraints, school routes, and other detour restrictions.

**FIGURE 4.1-10 BRIDGES UNDER TRAFFIC RESTRICTION & SUBSTANTIAL COMPLETION**



**NTP1 December 17, 2014**

- Commercial Closing Date Has Occurred
- PennDOT has approved DBE Performance Plan
- Submit Insurance Policies Required Per Schedule 9

**NTP2 January 26, 2015**

- Approve Project Management Plan
- Approve Project Baseline Schedule
- Provide PennDOT with a copy of the contract between the DE and Construction Quality Acceptance Firm

**NTP3 Issued By Bridge Starting May 28, 2015**

- Appropriate Governmental Approvals
- Submittals Required Per Attachment 2-2 Approved
- Submit Request for Issuance of NTP 3 to PennDOT
- DBE Performance Plan Updated to Federal Requirements

**LEGEND**

● Milestone Dates    ■ Early Completion Bridges/Remaining Eligible Bridges - Summary    ■ Early Completion Bridges - Key Durations    ■ Remaining Eligible Bridges - Key Durations



# Preliminary Quality Management Plan

# PRELIMINARY QUALITY MANAGEMENT PLAN

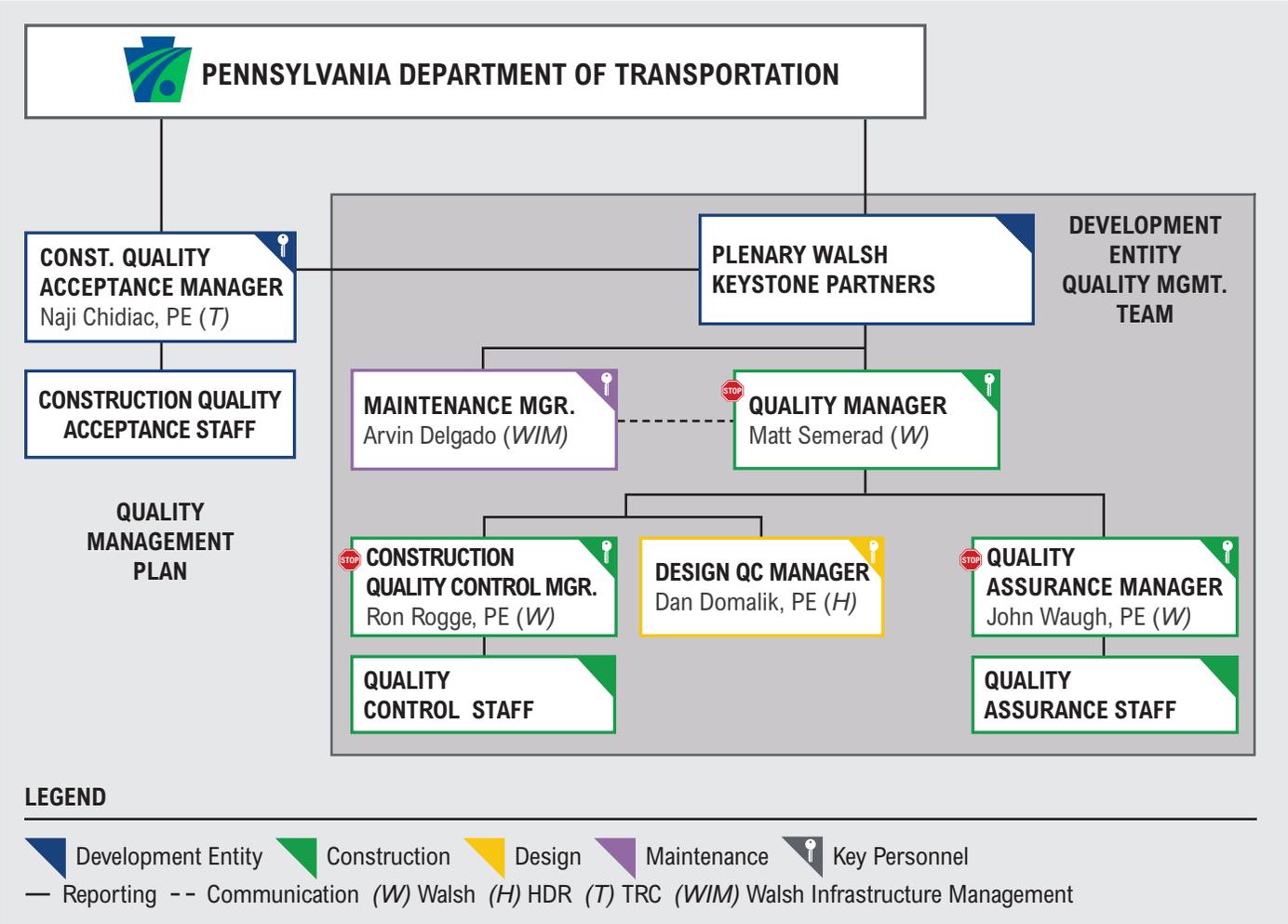
PWKP will design, build, maintain, and hand back 558 high-quality bridges using proactive quality processes refined from the Oregon Bridge Delivery Program, as well as construction of over hundreds of Pennsylvania bridges, and over 38 independent PennDOT quality inspection contracts in 2013. PWKP's Quality Program will reduce errors and re-work, expedite cost-efficient delivery, and ensure that handback meets or exceeds PennDOT's standards.

PWKP's Quality Management Plan (QMP) defines the processes and accountability measures to build a high-quality product correctly the first time, saving money, maintaining schedule, reducing maintenance costs, and providing PennDOT and its stakeholders with a more durable and attractive finished product. PWKP's QMP will be implemented and managed by

the key personnel shown in **Figure 4.2-1**, although all Project team members will be responsible for ensuring quality in their respective field. Each of PWKP's key personnel meet or exceed PennDOT's requirements for relevant quality experience. Simply stated, PWKP has dedicated the right people to execute the right plan.

**FIGURE 4.2-1 PWKP'S QUALITY MANAGEMENT TEAM**

Per PennDOT's requirements, PWKP's Quality Manager, Quality Assurance Manager, and Construction Quality Control Manager have stop work authority. PWKP has granted stop work authority to all key members of its Quality Management Team, and all key personnel, as a demonstration of commitment to quality.



PWKP's QMP conforms to ISO 9001:2008, which is the internationally recognized standard for QMS. The text that follows details the three primary sections comprising PWKP's QMP:

- » Design Quality Management Plan (DQMP)
- » Construction Quality Management Plan (CQMP)
- » Maintenance Quality Management Plan (MQMP)

PWKP will use the quality approach that is developed and refined as part of the DQMP and CQMP to form the framework for the MQMP, reflecting our commitment to continuous improvement.

## DESIGN QUALITY

### Design Quality Process

The DQMP will incorporate quality throughout the design process, rather than adding it at the end. This requires a proactive, not reactive, approach to design quality. Quality becomes everyone's responsibility and part of all work processes. The DQMP includes Quality Control (QC) processes to help generate work that meets or exceeds the Project requirements. It also includes Quality Assurance (QA) processes that provide confidence the procedures were followed and achieved their intended goals.

 DQMP procedures will encompass more than bridge/structures tasks. The entire scope of design activities – environmental, ROW, utilities, survey, roadway, drainage – will be addressed. The Design QC Manager (DQCM), Dan Domalik, PE, will be responsible for developing and implementing effective quality procedures for all of these areas.

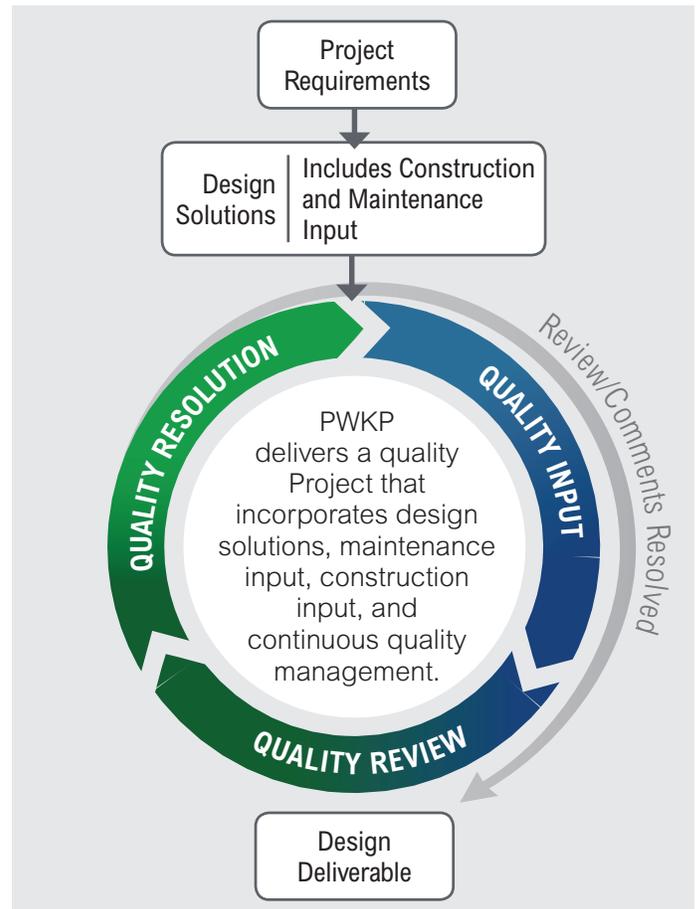
**Figure 4.2-2** summarizes the overall quality philosophy as implemented for design. Each production, checking, QC, and QA step can generate required changes to the deliverables. Changes are documented and verified prior to certification and submittal. This process is iterative and comprehensive, and will be completed from preliminary production through delivery stages.

### Minimization of Impacts to Utilities

The DQMP will detail procedures to minimize utility impacts through a Utility Management Program (UMP). The UMP is based on extensive research, strong communication, and early action. PWKP

### FIGURE 4.2-2 DESIGN QUALITY PROCESS

PWKP's design process requires both quality input and concurrence to produce deliverables.



created a Master Utility Conflict Matrix to support proactive engagement with all stakeholders and early construction. The DQMP will include procedures to incorporate the matrix and mitigation strategies into the design and review processes. QC and QA audits will confirm the use of the matrix and UMP processes, optimizing design and construction. PWKP's strategy to minimize impacts to utilities through design is detailed in Section 4.7.

### Minimization of ROW Impacts

PWKP will minimize both the amount of ROW takes and the Project's impacts on adjacent property owners, using QC procedures and guidelines to minimize ROW impacts with tested and proven mitigation measures. Methods include temporary access relocation and fencing, noise and vibration monitoring, and other best practices detailed in Sections 4.4 and 4.7. Design QA processes will verify that guidelines and best practices were used.

## Independent Reviews for Final Design Documents



PWKP's design quality process verifies final design documents with the following processes:

- » **Constructability Reviews:** PWKP construction team members will review designs to ensure buildability and help incorporate cost and schedule efficiencies as well as quality improvements. Constructability reviews will be conducted on a bridge-by-bridge basis, typically at the Type, Size, & Location (TS&L) and final design phases.
- » **Reviews for Completeness, Clarity, and Accuracy:** PWKP will conduct detailed checks – independent of the person who performed the design – to verify completeness, clarity, and accuracy of the design work product. The procedure will include specific guidance for performing and documenting checks of:
  - Calculations
  - Reports
  - Drawings
  - Specifications
  - Spreadsheets
  - Computer Analyses
- » **Back Checking:** Once deliverables have been reviewed internally, designers will have the opportunity to back check internal comments and revisions. Designers and checkers will discuss and resolve outstanding comments before moving to the next step in the design process.

## Design Deliverables

### DESIGN CRITERIA & INPUTS

The design deliverable process begins by ensuring the design team is fully aware of the relevant criteria, requirements, and scope. This includes the applicable design standards, given baseline documents, and Project-specific documents that form the basis of design. These will be organized, maintained, and shared in the EDMS, and available in the Maintenance Management Information System (MMIS) during the Maintenance period. These design inputs will be referenced by designers, checkers, and reviewers as part of the overall design deliverable process.

## DESIGN PHASES

Design deliverables for an individual bridge or bundle will generally progress through four stages:

1. **TS&L:** Conceptual-level submittal of bridge type and general layout.
2. **Final Design:** Complete design submittal (not sealed).
3. **Released For Construction (RFC):** Complete design submittal revised for final design comments (sealed).
4. **As-Built Drawings:** Record drawings that document as-built condition of bridge.

### DESIGN APPROVALS

The deliverable process for each design phase will progress through several hold points prior to a submittal being released. These include detailed checks, quality control reviews, audits, and a final certification.

### DESIGN CHANGES

After the RFC submittal is released, the CJV can issue Requests For Information (RFI) to seek clarification of the designer's intent. RFI responses will undergo a checking, review, and approval process similar to that followed for design deliverables. A Notice of Design Change will be issued for post-RFC changes that have a significant impact on the design and RFC deliverable documents. Changes to the revised documents will be clearly identified and will go through checks and reviews. PWKP will use an expedited review process for changes that do not significantly modify the design intent. This expedited process will be documented and filed in the EDMS.

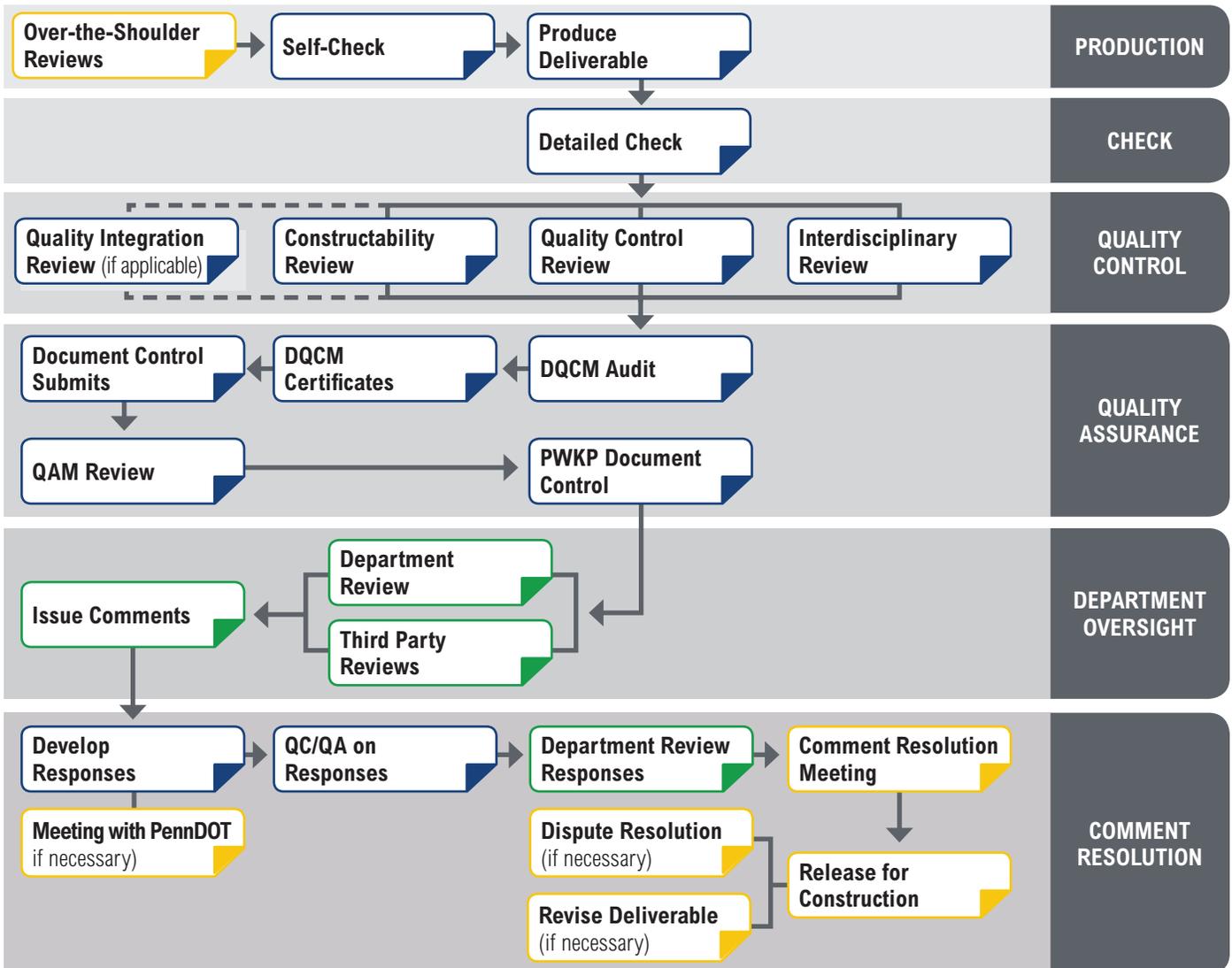
### INTERNAL PROCESS FOR DESIGN REVIEWS

PWKP's design review process is illustrated in **Figure 4.2-3**. Multiple subject matter experts review the work from a variety of different perspectives to ensure that Project requirements and quality standards are met.

The Design QC Program spans all disciplines and design team members, including subconsultants. Designs are not reviewed as a standalone item, but shared for review across the team to identify and address any possible conflicts.

**FIGURE 4.2-3 DESIGN REVIEW PROCESS**

All design documents will be reviewed by designers, checkers, and reviewers, and organized, maintained, and shared in the project EDMS.



**LEGEND**

- ▴ PWKP
- ▴ Department
- ▴ PWKP and the Department

**PROJECT REQUIREMENT CHECKLISTS (PRC)**

PWKP will develop PRCs to summarize the technical requirements for a given discipline and/or deliverable type as a resource for designers, checkers, and reviewers. Once completed, they become part of the required documentation of the QC process for a deliverable.

**QUALITY CONTROL**

PWKP’s QC will include:

- » **Quality Control Reviews (QCR)** performed by senior-level experts in the work being reviewed to verify correctness and logic of design solutions.

- » **Interdisciplinary Reviews** coordinate work between different disciplines.
- » **Constructability Reviews** conducted by the CJV to confirm efficiency and buildability of the design.
- » **Quality integration** personnel and review processes that strive to create a consistent result across the Project and integrate work with adjacent areas. The quality integration function will include:
  - Standardization of processes and product
  - Consistency reviews of all work
  - Review of interfaces between the work and areas outside the limits of work.

## Stopping Design Work or Elevating An Issue

The DQCM can notify the Lead Engineer to stop design work if needed on a particular element until proper corrective and preventive actions are taken. This stop-work process will be part of the NCR workflow. In addition, progression and submittal of the design is dependent on closure of all checker and reviewer comments. The iterative nature of the checks/reviews and resolution is shown in **Figure 4.2-2**. Each submittal must achieve this resolution between the designer and checkers/reviewers before it can be audited and submitted. If a comment cannot be resolved at the design team level, it will be handled via an escalation ladder through the discipline lead and ultimately the Lead Engineer, if necessary.

## Submitting Design Documents

All design documents submitted to PennDOT will undergo the processes described herein as part of the DQMP. Figure 4.2-3 summarizes the design process from production through the various stages of checks and reviews to submittal. Internal audits by the DQCM will verify that the quality processes were followed and the submittal is complete prior to delivery.

Final design phase submittals will contain the DQCM's signed certification that the work complies with the contract, has been checked and reviewed per the DQMP, is ready for construction, and has received all necessary approvals.

## Quality Assurance and Quality Control Functions

### QUALITY ASSURANCE (QA)

QA activities provide adequate confidence that PWKP's product fulfills quality requirements and satisfies given needs. Overall responsibility for QA rests with the Quality Manager (QM), Matt Semerad. The DQCM and the Quality Assurance Manager (QAM) support the QA efforts of the QM.

### INTERNAL AUDITS

PWKP will conduct internal audits to independently evaluate the effectiveness and compliance to QC processes. There are two types of internal audits:

- » **Scheduled Audits:** Audits performed by the Design QC Manager of each submittal after

checking and review processes are complete. A closed scheduled audit then becomes the basis for the deliverable QC Certification of Compliance.

- » **Periodic Audits:** Audits by the QA Manager for overall QC compliance. These audits are less frequent than scheduled audits and may be broader in scope.

### QUALITY CONTROL

PWKP's QC activities will ensure that the work product meets the Project requirements. The QM has overall responsibility for QC activities. The DQCM and CQCM report directly to the QM as part of an integrated design-construction QC system.

### EXTERNAL AUDITS

PWKP will cooperate with audits of the QMP by external agencies, such as PennDOT or FHWA. This includes making documents available for audit review, responding to audit findings, and taking necessary corrective actions.

### MANAGEMENT REVIEWS

 PWKP's senior management team will conduct management reviews of the QMP's effectiveness at least twice each year. These reviews will be documented in the Project files.

### DEFINITION AND EXECUTION OF REQUIREMENTS

PWKP's design success is predicated on team members' solid understanding of the Project requirements. These requirements become the basis for the design criteria, Project Requirement Checklists, and audit documentation. The Design QC Plan will define the process and documentation requirements for ensuring the requirements are built into the work.

## Reporting Approach Including Relationships

The DQCM reports directly to the Quality Manager for handling of disputes, submitting reports, and performance monitoring. The DQCM can also notify the QM of critical issues that could potentially impact the quality of the work.

The DQCM works closely with the Lead Engineer to ensure the designers understand the QC requirements, that QC resources (checkers and reviewers) are available, and that submittals are prepared according to



## QUALITY LEADERSHIP

Matt Semerad will lead the Quality Team, bringing his experience serving in quality management roles on bridge projects including the \$175M Moses Wheeler Bridge and the \$234M I-35W Street Anthony Falls Bridge.

DQMP requirements. In addition, the DQCM will respond to design audits performed by the QA Manager.

### PERSONNEL QUALIFICATIONS

PWKP's Quality Management Team members have the qualifications and experience to execute their responsibilities on this Project. The QMP will define the necessary qualifications for technical staff, detailed checkers, reviewers, and design leadership. Roles and assignments will only be given to personnel that meet or exceed the required qualifications.

PWKP will use a continuous program of design QC training to help maintain a high level of DQMP compliance. The training will be created and delivered by the DQCM to all staff actively working on the Project, including subconsultants, and will include:

- » **General Training:** Introductory training to the Quality Management System (QMS)
- » **Refresher Training:** Focused on updates to QMS
- » **Topical Training:** Training on specific QC topics and issues noted in Nonconformance Reports

### Integration of the Department's Comments

#### DEPARTMENT OVERSIGHT

 PWKP will seek PennDOT input early and often in both informal and formal reviews to help minimize surprises, reduce the number and severity of late changes to the design, and reduce review times required by PennDOT. PennDOT oversight will be provided in the following ways:

- » **Design Reviews:** PennDOT will conduct formal written reviews, documenting each comment in a matrix developed by PWKP. Each comment will note the applicable source of the related Project requirement and will receive a status that tracks it from generation through closure. Design Reviews are intended to support submittals that require

PennDOT approval, specifically TS&L packages and foundation reports.

- » **Over-The-Shoulder Reviews:** These will be less formal interactions that occur during production to keep PennDOT aware of design status and progress. Over-the-shoulder reviews can be called by the DE or PennDOT and will not typically require written comments and responses. The goal of over-the-shoulder reviews is to reduce the number of formal Design Review comments.

### Integration of Department and Federal Oversight

PWKP will engage PennDOT early with formal Design Reviews and approvals to expedite the delivery of subsequent RFC designs that meet the Project requirements. A Deliverables Matrix will define the submittals and their related PennDOT action (discretionary, non-discretionary, review, and comment).

Requirements set by third-party stakeholders, like municipal, regulatory, and Federal agencies, will be integrated into PWKP's PRCs and design criteria. Federal oversight and input from other stakeholders will be consolidated and integrated into PennDOT's design oversight process, making it easier to meet the requirements and resolve comments generated by third-party oversight.

### Corrections to Design Deficiencies

PWKP will use a proactive approach to tackle potential deficiencies at the earliest possible stage. The easiest deficiency to address is one that never occurs in the first place. With that in mind, several proactive processes will be in place to prevent potential deficiencies from becoming realities. They include:

- » **Design Exceptions:** Requests to deviate from requirements and standards will be made when they are in the best interests of the Project. Modifications to standard requirements will be communicated to the design team and will be built into the design criteria, and audit processes.
- » **Comment Resolution:** A vigorous process for resolving comments between designers and checkers/reviewers will quickly bring possible noncompliances to the table for discussion. PWKP will hold prompt comment resolution meetings in order to resolve or escalate comments.

- » **Comment Escalation:** PWKP will escalate issues that are not resolved in the comment resolution process to the next level. The DQCM will maintain an Escalation Log to track issues and promote rapid resolution and incorporation if needed.

**Noncompliances:** Potential noncompliances may be discovered and documented by the design team, quality management, or PennDOT. A Noncompliance Report (NCR) workflow and form will be used to address and correct the issue. The NCR form will note the following information:

- » Description of the noncompliance
- » Basis for the noncompliance
- » Root cause
- » Corrective actions
- » Preventive actions for the future

**Continuous Improvement:** PWKP will promote continuous improvement by seeking opportunities to learn and improve in real-time during the Project. PWKP has an established process for improving all aspects of work processes and product.

- » **Quality Metrics:** The DQMP will define specific quality metrics that will be tracked, studied, and included in the monthly reports. Trends in the metrics will be analyzed to determine necessary training, staffing changes, and process improvements.
- » **Lessons Learned:** Lessons learned from past successes and failures will already be part of the basis of the initial QMS. Additional knowledge gained during the Project will be documented and shared to benefit this Project and future projects.
- » **Audits:** If mistakes occur at any phase, PWKP will conduct audits to understand the causes and develop Standard Operating Procedures (SOP) for future prevention.
- » **Management Reviews:** Regular reviews of the QMS by DE management will generate feedback, which will be used by the Quality Manager and the rest of the quality team to improve our written QMS and our processes for implementation.

## Incorporation of Audit Findings

PWKP will incorporate audit findings from scheduled submittal audits, periodic QA audits, and external audits into the DQMP to continuously improve our design process. PWKP will revise design criteria,



## CONTINUOUS IMPROVEMENT

PWKP strives to continuously improve its quality processes using a system of lessons learned, metrics, and management reviews. PWKP team members are using formal continuous improvement processes and quality debriefs on the Tappan Zee Bridge DB, pictured below.



Project Requirements Checklists, and documentation procedures, if needed, based on audit findings.

Changes required by scheduled audit findings of design submittals will be incorporated prior to audit closure and submittal. Thus, the audit serves as a hold point for the design until the required corrections are made.

## Documentation of Design Quality Management

### DOCUMENT CONTROL

PWKP's documentation and EDMS will provide a tool for consistent and rapid communication that generates a clear and easily accessible record for the Project files.

The design production, checking, and review documentation will be stored in ProjectWise, a document management system that allows for access/permission control, file check in/check out, version control, and archiving. ProjectWise will enable designers from any location to share the same controlled project files from within an intuitive folder and file structure.

The EDMS and QMS will include processes for the following for use in ProjectWise:

- » File folder organization
- » File formats
- » File naming convention
- » Document workflow

- » Revision control
- » Quality records
- » Backup
- » Archiving
- » Retrieval

Quality documentation will be properly filed, searchable, and accessible to PennDOT and the PWKP team.

### QUALITY DOCUMENTATION AND REPORTING

The design team and the CJV will generate a variety of quality documents and reports and them make available to PWKP management:

- » QMP
- » Design inputs, such as baseline documents, design criteria, or Project Requirement Checklists
- » Checker markups of proposed changes
- » Review matrices including reviewer comments, responses, and records of closure.
- » Audit reports
- » Monthly reports of quality results
- » NCRs
- » Other items such as QC training materials, root cause analyses, tools and templates, and validation documentation.

**QUALITY PROGRAM EXPERIENCE FOR LARGE P3 PROJECTS:** Walsh successfully implemented a comprehensive quality program on the Ohio River Bridges East End P3 Project.



## CONSTRUCTION QUALITY

### Construction Quality Process

PWKP strives to build a quality product correctly the first time to reduce cost; maintain schedule; reduce maintenance cost and impact; and provide a more attractive finished product to PennDOT, their customers, and the community. PWKP's QMS conforms to ISO 9001:2008 and will be supported by the corporate policies and objectives of PWKP team members to do work correctly the first time, exceed owners' expectations, and promote continuous improvement.

Early implementation of the CQMP will be essential to achieving a proactive quality culture as it will provide the required systems and procedures to assure that quality is integrated into every operation.

PWKP's CQMP encompasses QC, QA, and quality acceptance activities and procedures. While QC does interface with QA through the Task Quality Analysis and Production, quality assurance is engaged directly through inspections and feeds information back to quality control for continuous improvement through auditing and revision. This process is illustrated in **Figure 4.2-4**, and explained below.

- 1. Develop Work Plans:** Work plans are created with standardized Inspection and Testing Plans (ITP) for all permanent definable features of work (DFOWs.) These QC work plans will outline the QC, QA, acceptance requirements, testing frequencies, acceptance criteria, control and hold points, rejection procedures and reporting procedures per the contract documents. Once complete, the CQAF will approve the work plans. Once approved, the work plans will be communicated to the contractor and used throughout the Project on repetitive DFOWs.
- 2. Create SOPs:** SOPs are QMP addendums that can be quickly distributed to the Project level. SOPs vary greatly but consist of special process control requirements, material control requirements, reporting procedures, miscellaneous best practices and our project QC Stand Down.
- 3. Site Level QC Initiation Meetings:** All major definable features of work will be required to have a documented initiation meeting at the site level. The intent of this meeting is to utilize production

field supervision to educate their team with the work plan and pertinent SOPs for the work prior to commencing a scope.

- 4. Execute Scope:** Prior to scope execution, materials, and equipment on-site are examined to ensure that all specified requirements are met, that qualified QC and QA inspectors are ready, and that the workforce is prepared to execute the work, safely and with the appropriate skills and knowledge of the quality requirements of the work to be installed. Foremen and crews will then use the work plan, SOPs, and initial meeting comments, to execute scheduled tasks.
- 5. Assess Quality Performance:** Daily task quality assessments will be completed by field supervision at the end of each day to track the quality performance of all crews performing work.

The primary means to connect the workforce to work requirements is through the Task Hazard Analysis/Task Quality Analysis (THA/TQA) process. This task-specific process focuses on the safe practices to perform the work and the construction/physical characteristics of the built element that attain specified requirements.

PWKP will create detailed quality ITPs for each DFOW that includes measures to verify materials and workmanship. The work plans will identify

coordination between the DE process control and PennDOT’s inspection and testing protocols. Documentation of daily work, inspections, and test results are posted to SharePoint.

- 6. Audit and Revise:** This proactive quality control program embraces the philosophy of continuous improvement.

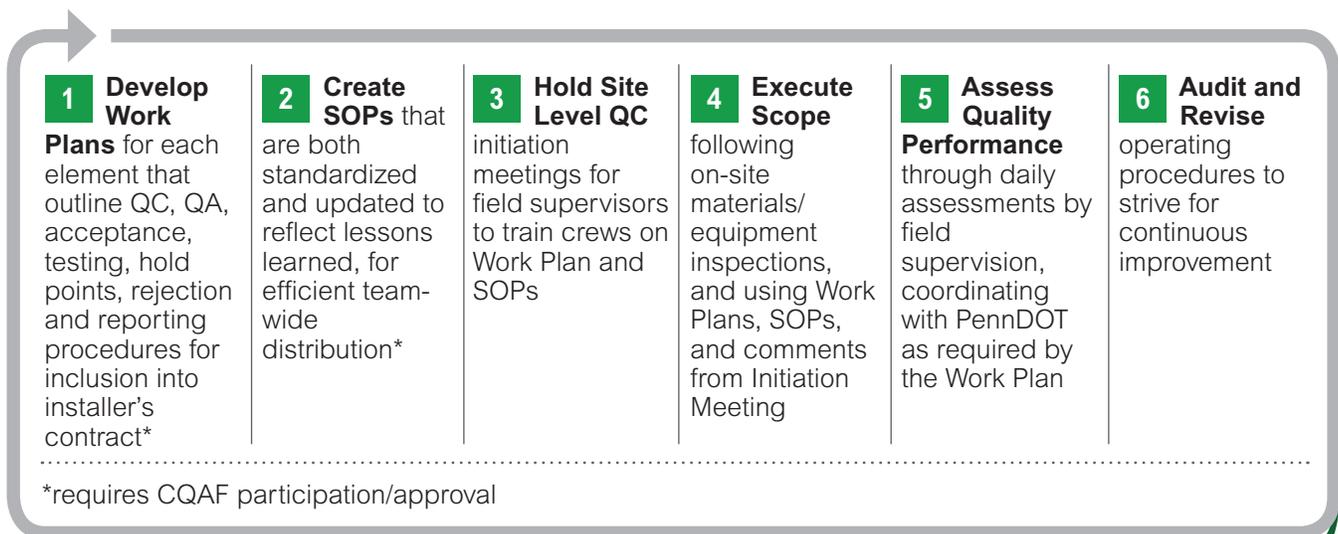
### Integrating with Design, Control of Materials, Acceptance Testing, Inspection, and Reporting

Quality acceptance, though not directly involved with QC and QA, is an integral yet independent part of the quality process. The intent of the Construction Quality Acceptance Firm (CQAF) is to have an independent accountability, separate from the CJV, who will represent PennDOT’s best interests by auditing PWKP’s performance against the QMP.



PWKP has partnered with TRC to fulfill the responsibilities of the CQAF. TRC has performed quality inspections, reviews, and testing for PennDOT for 24 years, working in an identical capacity to their role as the CQAF on this project. The CQAF team will be led by Naji Chidiac, PE, the Construction Quality Acceptance Manager (CQAM). He is a former PennDOT District Structures Control Engineer with 22 years of PennDOT experience and has managed

**FIGURE 4.2–4 CONTINUOUS IMPROVEMENT DURING CONSTRUCTION**



**QUALITY MANAGEMENT CONTINUOUSLY IMPROVES TO YIELD FUTURE BENEFITS TO PENNDOT**



**INTEGRATED DESIGN AND CONSTRUCTION:** PWKP's design and construction teams have been integrating through Technical Work Groups (TWGs) and weekly meetings for the past six months.



quality control activities for 3,000 structures in eight Pennsylvania counties.

During the pre-construction phase, PWKP will prepare and submit the QMP, which describes and dictates the processes, management, control, and documentation of the design process, quality of materials, equipment, workmanship, fabrications, and operations. The SOP for Quality Incident Reports (QIR) and deficiency correction will be submitted as an appendix to the QMP, which will be approved by PennDOT and the CQAF, and is outlined below.

Construction quality, such as material control, inspection, testing plans with hold points, construction monitoring, fabrication monitoring, and rejection procedures are all outlined in the ITP and work plans. Therefore, QC will be established by an effective plan to execute the work correctly, followed by team education.

QA will use certified testing per the plan. Quality acceptance of these tests will be in the form of approval of the plan and the confirmation and auditing of the QA testing.

### Preparing and Reviewing Incident and Non-Conformance Reports and Non-Compliance

PWKP will use NCRS and QIRs to promote continuous improvement. PWKP will use QIRs to identify issues and develop corrective actions that meet or exceed design expectations, mitigating similar issues in the future and strengthening the quality program.

PWKP team members will initiate a QIR when the expectations outlined in the pertinent scope's ITP, design tolerances, or project SOPs do not align with the produced product.

The contractor will complete the initiation page, which identifies the deficiency, the root cause, and proposes an acceptable corrective action for the issue.

The CQCM will receive and review the initiation portion of the QIR. If the resolution is deemed acceptable, the CQCM will submit the document to the design team and the CQAM for approval.

Once the QIR is approved, the QCM will forward the resolution to the contractor who will be responsible to remedy the work per the corrective action and the QIR from a list of 10 root causes and inventory the issues and compile the deficiencies in a QIR Log.

The root cause meta-data is used to determine a quality Experience Modification Ratio (EMR) for individual contractors, individual root causes, individual bridge types, etc. This ability to classify lessons learned will allow us to mitigate future issues by adapting our QC Program, design, and subcontractor procurement.

**QUALITY WORKMANSHIP:** Before placing concrete on the Whittier Bridge Replacement in Amesbury, MA, Walsh crews perform a final quality check through an extensive pre-placement inspection. This is part of Walsh's standard corporate quality program.



## Role and Function of the CQAF

The CQAF's primary focus will be on specification compliance reviews, document control reviews, materials acceptance sampling and testing at the production and project sites, on-sight equipment and calibration checks, federal requirement conformance audits, and other confirmations that the QC plan is executed correctly. The CQAF will be responsible for:

- » QMP approval
- » ITP (work plan) approval
- » SOP approval
- » Inspections/tests and lab analyses
- » Program audits
- » Corrective action approval
- » Certification that work meets QMP criteria

The results of the CQAF's findings will always be communicated efficiently to the DE's Quality Management Team and PennDOT for changes and continuous improvement. Although the QM and CQAM are coordinating continuously, both parties understand that the CJV will have no influence on the determinations made by the CQAF.

## Integrating with Design Activities and Department Oversight

During the proposal process, key management staff from PWKP's construction team were involved in the integration of design development and quality management planning. PWKP's TWG structure and weekly meetings involved design and construction personnel for the last six months. This will continue following contract award. PWKP's early partnership will allow design execution with constructability feedback, contributing to enhanced quality in the final product, as well as cost and schedule efficiencies and improvements. PWKP's constructability solutions are discussed in further detail in Section 4.7.



### INTEGRATION WITH PENNDOT QUALITY

TRC, the CQAF, is the only PennDOT-approved inspector performing inspections at prestressed girder plants - working in an identical capacity to their role on this Project. TRC also helped develop the EQMS documentation system that PennDOT currently uses.

## Department and Federal Oversight

Documentation of design, daily work, task quality assessments, checklists, inspections, and test results are posted to SharePoint and are available to appropriate parties within PWKP, the CQAF, and PennDOT. Work schedules are also communicated in various project coordination meetings and via SharePoint to ensure proper work forces and independent QA/QC functions are made available at the time and place of work execution. All information routing will be identified on the individual scope's inspection and test plan and confirmed at each initiation meeting.

## Documentation of Construction Quality Management

PWKP will store all documentation from the quality management process on Sharepoint to provide access/permission control, file check-in and check-out, version control, and archiving. PWKP will generate and file the following documents and make them available to PennDOT and the entire team:

- » QMP
- » Design inputs, such as baseline documents, design criteria, or Project Requirements Checklist
- » Checker markups of proposed changes
- » Review matrices
- » Audit reports
- » Monthly reports of quality results
- » NCRs
- » QC training materials, root cause analyses, tools and templates, and validation documentation

**QUALITY CHECKS:** Walsh performed quality checks for bolt tightness on the I-90 Cleveland Innerbelt Bridge Design-Build Project through a comprehensive QC program.



## MAINTENANCE QUALITY

### Quality Activities and Procedures

PWKP's MQMP will be implemented through routine maintenance, renewal, and handback, using QA, QC, and quality acceptance activities. PWKP's quality approach ensures that maintenance work is completed correctly the first time, eliminating the need for remedial work. Ultimately, PennDOT will benefit from PWKP's comprehensive and integrated approach to QA, QC, and quality acceptance.

### QUALITY ASSURANCE

The QM will have overall responsibility for QA functions during the Maintenance Period. On occasion, he may delegate QA functions to the QAM for renewal and handback work, and to maintenance staff. He will work collaboratively with maintenance staff to leverage the collective knowledge and experience of the entire team. The QA procedures in the MQMP will be based on the development and continual improvement of QA activities, including the creation of best-practice-based processes and procedures, initial and ongoing training of Project staff, and auditing to ensure compliance.

Best-practice-based processes and procedures will be developed by the QM, with the assistance of the QAM, the CQCM, and maintenance staff that possess the hands-on knowledge of industry best practices, PennDOT practices, and maintenance requirements. Project processes and procedures will be reviewed annually, at a minimum, and revised to remain current with industry changes, as required.

QA training will be focused primarily on individual task requirements, safety awareness, and performance requirements. Employees will be trained upon hire, prior to conducting maintenance activities, and following revisions to Project processes and procedures or changes to Project performance requirements. Training will consist of on-site sessions, internet or computer based training, and self-study. The training program will be monitored and adjusted throughout the Term to meet continuous improvement goals.

### QUALITY CONTROL

Overall responsibility for QC during the Maintenance Period resides with the QM, who may at times delegate

### SPECIALIZED BRIDGE MAINTENANCE TRAINING:

PWKP's inspectors are trained to detect early signs of deterioration, such as the loss of concrete cover and corrosion pictured below, and use the MMIS to immediately schedule maintenance work to avoid further damage.



responsibility for development and implementation of the QC portion of the MQMP to the QCM. The QC program will be developed with the assistance of on-site staff to benefit from field knowledge and experience and also increase "buy-in" to the program. The QC program will consist of specific inspection and testing activities designed to provide the PWKP team, and PennDOT, with confirmation and validation that the conducted activities meet or exceed expectations.



Inspection of maintenance activities and materials testing will be conducted by trained staff with a frequency in accordance with required standards to ensure that PWKP inspects a representative sample of maintenance activities. While primarily field-focused and visual in nature, PWKP's inspection and testing program will also verify the quality of administrative functions, such as PennDOT notifications, reporting, and documentation.

Documentation from inspections will be compared to the QA developed processes and procedures. QC inspections will include visual inspections of maintenance work such as bridge deck and bearing washing, bridge joint repairs, concrete patching, and bridge deck overlay installations. Inspection reports will detail the activities conducted, compare against documented QA processes and procedures, report on conditions such as weather and traffic, and list any corrective actions necessary to ensure continuous improvement. The corrective actions noted may be directed toward the activity, asset, or outcome, and may identify required

revisions to QA processes or procedures. This loop of improvement from process and procedure to final work product will ensure PWKP maintains the most effective quality program and PennDOT realizes the greatest benefit to their assets.

 QC testing activities will be conducted at either PennDOT prescribed or at industry best practice frequencies, whichever is shorter. Testing will be conducted by quality staff, Project maintenance staff, or sub-consultants, depending upon the testing type. Required testing of materials will include, as needed, material certifications from suppliers or manufacturers, field testing of materials prior to placement and post placement testing of materials or material samples.

For major renewal or rehabilitation work, or for major repairs associated with severe damages to structures, that require engineered designs, designs will be procured from sub-consultants, and PWKP's DQCM will be involved to validate that design-build processes are followed per the Project Management Plan, and PennDOT standards, with the same levels of quality implemented during the Construction period.

### QUALITY ACCEPTANCE

Quality acceptance is the capstone of PWKP's quality process. Once QA and QC activities are complete, PWKP will conduct and document quality acceptance activities. Document control activities will ensure full historical records of quality activities are stored and available throughout the Term. PWKP believes comprehensive recording and filing of the full cycle of quality activities including documentation of final quality acceptance is critical to the goals of the MQMP.

### INTEGRATED APPROACH

The MQMP will uphold PWKP's philosophy that quality, like safety, is everyone's responsibility. Quality related functions will be integrated into the maintenance activity's standard operating procedure. The integration of the quality process into the self-monitoring and self-reporting program, and inspection and certification program, begins with PWKP's maintenance staff involvement in the development of the MQMP. This involvement fosters the understanding that, while the implementation of the MQMP is considered independent of the maintenance work, the activities themselves are integral to the PWKP team's goal of providing the required services with the highest level of quality.

### INSPECTIONS TO AVOID NONCOMPLIANCE ISSUES:

Regular inspections will ensure that PWKP proactively maintains assets, such as addressing poor reflectivity on signs, before they become noncompliance issues.



The entire Project team, including support personnel, will be trained to understand that quality must be monitored and deficiencies reported by all. During any maintenance work activity, documents will be prepared, recorded in the MMIS, and filed in accordance with document control procedures. Self-monitoring reviews of each relevant activity and related documentation will be conducted by either quality support staff or maintenance staff; deficiencies in process, work activity, or reporting will be self-reported; non-conformances generated and reported to PennDOT; and corrective actions determined and completed.

### Self-Monitoring and Self-Reporting

 PWKP has identified self-monitoring and self-reporting as two critical components to a successful and effective MQMP due to the Project's logistical and geographic challenges. PWKP's approach to quality will maximize the impact of each site visit, whether for inspection, maintenance, renewal, rehabilitation or quality function.

The self-monitoring and self-reporting approach will account for scheduled and unscheduled activities that will take place during the Term. Self-monitoring will include monitoring of the asset condition through asset inspections and condition assessments and monitoring of compliance with required processes and procedures.

 Maintenance staff will conduct inspections and assessments based on required frequencies and in an efficient manner reducing travel time and increasing effective time at each structure. NBIS

inspections will be done every two years, and condition assessments of bridge and non-bridge elements will be performed annually. This will ensure that staff maximize the number of visits to each structure to collect data, identify deficiencies, monitor compliance with performance requirements, and track asset condition trends.

When possible routine maintenance work will be conducted during the scheduled inspections or assessments, but if non-routine maintenance, renewal, or rehabilitation work is required, non-NBIS condition assessments will be conducted to further increase the data available for asset condition history and deterioration trend identification.



The inspection and maintenance program will be developed to be as efficient as possible and the quality self-monitoring program will be structured accordingly to ensure proper sampling of activities to provide statistical verification of quality levels.

Quality staff will be notified in advance of scheduled activities to ensure availability and access to Project staff and sites to allow for self-monitoring. Quality and maintenance staff will work collaboratively to ensure adequate self-monitoring occurs.

In addition to the field level self-monitoring, PWKP will conduct audits of the maintenance works and associated activities, including administrative, to verify compliance with the MQMP, contract performance requirements, and internal requirements. As a result of all self-monitoring activities, self-reporting will occur. For each self-monitored quality activity, a report will be compiled documenting the results of the self-monitoring activity.

## Preparing and Reviewing Reports

Reports, including maintenance monthly reports, maintenance annual reports, handback work plans, incident reports, non-conformance reports, traffic reports and maintenance work reports, will not be exempt from the Quality Management Plan or quality oversight.

The creation of each required report shall have a procedure documenting proper completion, review and submittal. As with all activities that have related procedures, the reporting activity will be subject to



## DOCUMENTATION DURING MAINTENANCE

Each self-reported record will be:

- + Entered into the MMIS
- + If an asset deficiency has been identified, a non-conformance will be issued
- + If a process, procedural, or resultant deficiency was identified, a corrective action will be tracked
- + Filed in the EDMS

routine audits and review in addition to the reviews required within the relevant procedures.

PWKP's procedures for creating reports shall include inherent steps for review such that QA audits will simply confirm accurate report creation, timely delivery, and accurate filing.

The basic procedural steps for preparing and reviewing reports will include:

- » Scheduling of required report delivery dates within the MMIS, when routine or planned, to ensure compliance with delivery dates
- » Initial input from field staff entered into the MMIS or documented on approved forms and filed within the EDMS
- » Analysis of available information and compilation into the approved report format
- » Review of draft report by maintenance personnel, other than the original author
- » Revisions to incorporate comments, either to the report or the report process, if required
- » Delivery of reports to PennDOT, as required per contract documents
- » Filing of all reports in the EDMS

If a non-compliance is found, either through self-monitoring, by PennDOT, or through third parties, it will be documented and a corrective action identified and implemented, using the same process followed during the Construction Period.

## Quality Integrated into Inspections

Maintaining a robust quality process is a key element to sustaining an efficient program of remedial and preventive maintenance inspections. Results of quality activities that assist in determining process or asset condition trends will be entered into the MMIS



## CONTINUOUS IMPROVEMENT DURING MAINTENANCE

If a negative trend is identified in an asset's condition or performance, PWKP will schedule increased remedial and preventive maintenance inspections to validate the trend and identify revised maintenance, renewal or rehabilitation practices.

and analyzed as part of the overall prioritization and scheduling process.

Negative trends in processes or procedures may consist of a disproportionate amount of non-conformances issued against certain processes or procedures. These identified negative trends will be used to initiate a more frequent review of the subject process or procedure and determine if a revision is required or if supplemental training of maintenance or quality staff is required.

PWKP recognizes that maintenance and quality related activities will be dynamic during the Term and must evolve based on industry best practices or simply to improve the overall quality process.

Schedule or scope of planned maintenance, renewal, or rehabilitation activities will be modified, based on findings from the quality process, to ensure Project assets are maintained at or above required performance targets.

## Department Involvement and Federal Oversight

PWKP's maintenance staff will ensure that PennDOT is provided with all notifications and reports in accordance with contract requirements. While proper notification and reporting is a contractual commitment, PWKP understands that the logistics and geographical diversity of the Project will add additional challenges. Maintenance staff will schedule routine meetings with PennDOT. Meetings are expected to be more frequent during Transitions, early stages of the Maintenance Period, and Handback Period, to understand the elements of most importance to PennDOT, review initial required reports to agree on format and content, and identify key quality processes contact points between PWKP and PennDOT.

As the Project progresses, PWKP will schedule joint meetings with PennDOT to review completed maintenance or inspection activities; quality control, quality assurance, and quality acceptance activities; results and process improvements; and planned activities for the next period.

Since PWKP maintains the responsibility for the FHWA safety inspections of critical infrastructure, additional Federal oversight may be required at times throughout the term. PWKP commits to provide full access to Project sites, staff, and quality records, to meet all Federal oversight requirements.

**HIGH-QUALITY AND PROACTIVE MAINTENANCE TO HELP PENNDOT MAXIMIZE ITS PROGRAM:** Quality procedures during the Maintenance Period will help PWKP improve the functionality of bridges under in-service conditions.



Scheduled routine inspections on this bridge revealed a void beneath the concrete slope protection.



The void was filled with flowable fill to avoid damage to the bridge.



# Preliminary Maintenance Management Plan

## PRELIMINARY MAINTENANCE MANAGEMENT PLAN

PWKP's whole-life solution minimizes renewal work during the Term, maximizing availability to Patrons, while still providing a cost-effective product to PennDOT. All work will be planned and scheduled in collaboration with PennDOT and other affected parties. Quality, safety, and environmental protection conditions will be part of all standard operating procedures, to minimize impacts from PWKP's work in neighboring communities.

### INTERNAL ORGANIZATION SYSTEM

PWKP, as the Development Entity (DE), will be fully responsible for management of this statewide Project and will provide oversight and management of maintenance risks during the Term. PWKP has a subcontracting agreement with Walsh Infrastructure Management (WIM) as its Lead Maintenance Contractor. This vertically-integrated structure provides several advantages throughout the Project Term:

- » Provides consistency in the delivery of services
- » Aligns interests among team members and improves collaboration within the team
- » Streamlines decision-making and issue resolution
- » Simplifies communication and documentation, including public information and communications

#### Internal Organization System

PWKP's maintenance structure will enable timely and efficient planning and execution of repair and renewal work, inspections, traffic control, and incident response during the Maintenance Period. PWKP's project management organization for the Maintenance Period is described below and shown in **Figure 4.3.1**.

**A. Organization Chart:** PWKP has established clear lines of reporting and interaction between team members. All maintenance staff report to the Maintenance Manager, Arvin Delgado, who then reports to the Project Executive, Matt Girard. The Operational Technical Support Team bring additional P3 maintenance expertise. Supporting Key Personnel interact directly with Arvin for efficient information exchange. Arvin is supported by an operations team consisting of local full-time inspectors and maintenance personnel.

**B. Key Personnel:** Matt will be the primary point of contact for PennDOT and is ultimately responsible for the performance of WIM and other subcontractors. Arvin will lead the day-to-day maintenance operations



#### PWKP'S KEY PRINCIPLES FOR 25 YEARS OF SUCCESSFUL MAINTENANCE

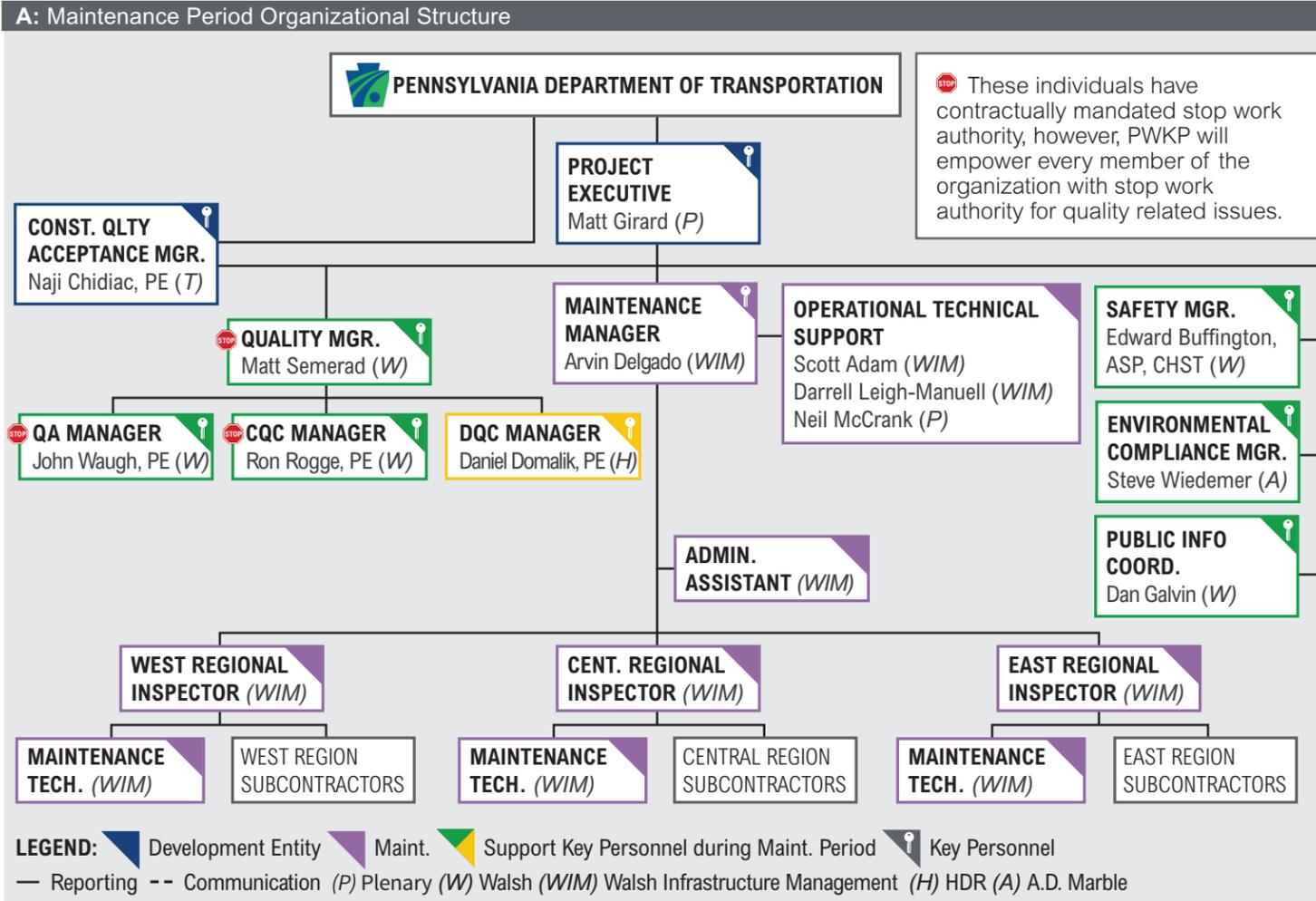
- + Collaboration:** Design-Build team engaged as needed to provide support and expertise. This is especially important during the Transition Period.
- + Excellence:** Qualified maintenance personnel continuously trained on the latest and best industry practices emphasizes a proactive approach to quality, safety, and maintenance.
- + Innovation:** Improved practices implemented whenever PWKP determines that new, innovative methods improve the pursuit of Project goals.
- + Communication:** PennDOT and other agencies and stakeholders proactively informed of Project status and local maintenance activity, and encouraged to actively participate.

and communications with PennDOT, supported by Key Personnel from the Design and Construction Periods, who bring their expertise and Project knowledge forward into the Maintenance Period.

**C. Task Managers:** PWKP will recruit skilled, experienced, and motivated maintenance inspectors and technicians who share PWKP's overall values of excellence, hard work, ethics, and customer service. PWKP has in place a training program for maintenance task managers that will continuously enhance their capacity to provide outstanding, service to PennDOT and Patrons.

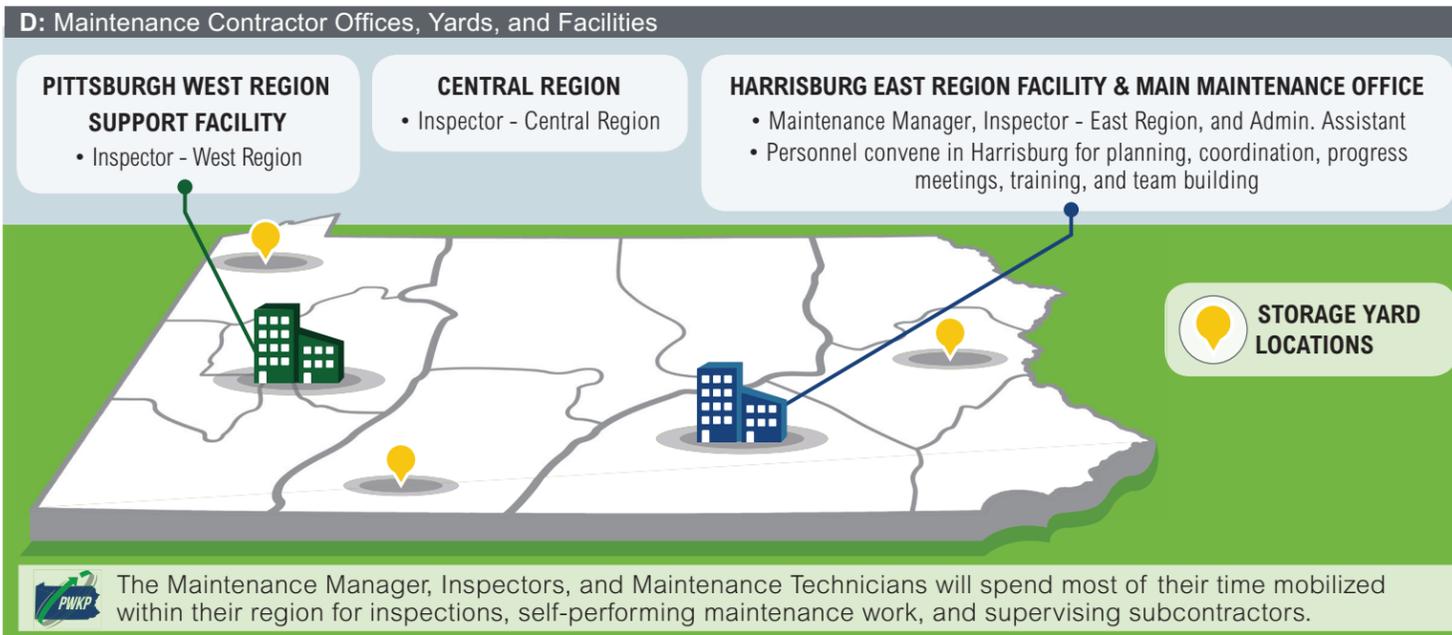
**D. Maintenance Locations:** PWKP has dedicated staff across three-regions to provide the detailed attention necessary to guarantee the performance of the assets. Assigned PWKP representatives will be responsible for all maintenance work obligations related to the Replacement Bridges and other elements within their respective region. PWKP also plans to use storage yards as required in strategic locations to assist in maintenance delivery.

**FIGURE 4.3-1 PWKP'S OVERALL PROJECT MANAGEMENT ORGANIZATION RELATING TO MAINTENANCE**



**B: Key Personnel During Maintenance**

- Project Executive, Matt Girard:** 25% or more as needed; Available at all times as requested by PennDOT
  - Contractual and financial oversight and accountability for Project obligations
  - Official communications
- Maintenance Manager, Arvin Delgado:** 100% (upon Substantial Completion of first Replacement Bridge)
  - Overall Project Maintenance Management and implementation of Transition and Coordination Plan
  - Plan/oversee execution of inspection, maintenance, and life cycle work
  - Daily interaction with PennDOT and local government personnel
- Public Information Coordinator, Dan Galvin:** Part-time as needed to perform duties
  - Keep public informed of maintenance work and all lane closures/restrictions
  - Official communication during emergencies and incidents
  - Liaise with PennDOT's Public Communications Representative
- Safety Manager, Ed Buffington, ASP, CHST:** Part-time as needed to perform duties
  - Manage Project-specific health and safety plan, including audits, inspection, training, and continuous improvement
  - Leads safety team and interfaces with maintenance staff
- Environmental Compliance Manager, Steve Wiedemer:** Part-time as needed to perform duties
  - Oversee implementation, compliance, and update of CEPP for Maintenance, and guide management of environmental issues
  - Verify environmental compliance of maintenance work
- Quality Manager, Matt Semerad:** Part-time as needed to perform duties
  - Oversee implementation and compliance with QMP for Maintenance
  - Update Quality Management Plan and oversee its implementation
- Construction Quality Acceptance Manager, Naji Chidiac, P.E.:** Part-time as needed to perform duties
  - Review, approve, and authorize procedures requiring Engineers' review and approval
  - Ensure construction methods, materials, and submittals are approved by necessary parties prior to Renewal Work
  - Ensure proper documentation of construction methods, materials, and submittals related to Renewal Work
- Construction Quality Control Manager, Ron Rogge, P.E.:** Part-time as needed to perform duties
  - Quality control training
  - Internal review of application of QMP and periodic review of quality of work on-site
- Design Quality Control Manager, Daniel Domalik, P.E.:** Part-time as needed to perform duties
  - Quality control for Renewal Work design
  - Review of design for repairs to structural bridge damages and for major work with hydraulic impacts
- Quality Assurance Manager, John Waugh, P.E.:** Part-time as needed to perform duties
  - Internal Audits of processes, systems, and procedures
  - Verify performance quality monitoring



**C: Task Manager Qualifications and Experience**

TASK MANAGER	QUALIFICATIONS	EXPERIENCE/TRAINING
<b>Regional Inspectors</b>	<ul style="list-style-type: none"> <li>Certified as Bridge Safety Inspector by PennDOT</li> <li>Passed PennDOT's PA CoRe Assessment Class</li> <li>Knowledgeable of Publication 238 Bridge Safety Inspection Manual requirements</li> <li>Knowledgeable of NBIS regulations CFR 650.3009 requirements</li> </ul>	<ul style="list-style-type: none"> <li>Performing NBIS, asset condition, and performance inspections</li> <li>Working with PennDOT District and local government personnel</li> <li>Executing routine maintenance work and renewal work</li> <li>Scheduling maintenance work</li> <li>Overseeing subcontracted work</li> <li>Assisting with routine maintenance work planning, life-cycle planning, and Handback work planning</li> </ul>
<b>Regional Maintenance Technicians</b>	<ul style="list-style-type: none"> <li>High School Diploma or GED</li> <li>Certified, or capable of becoming certified in ATSSA Traffic Control</li> </ul>	<ul style="list-style-type: none"> <li>Minimum of two years in construction</li> <li>Executing routine and periodic maintenance work, (i.e., bridge washing)</li> <li>Installing traffic control</li> </ul>

## PWKP’s Team Coordination

PWKP’s team members have worked together during the Project’s development phase to arrive at design solutions that optimize delivery, constructability, maintainability, availability to Patrons, asset life cycle, and handback requirements. This effort is continued throughout the Term of the Project with specific interface to ensure the successful transition into the Maintenance Period, delivery of the early handback elements, execution of maintenance work and renewal work, and a satisfactory handback to PennDOT (Figure 4.3-2).

WIM will lead the planning, scheduling and execution of maintenance, and rehabilitation, for both self-performed and subcontracted work. WIM will primarily self-perform maintenance work and use subcontractors, as needed, to ensure adequate maintenance resources throughout the Term, as shown in Table 4.3-1. WIM will mostly subcontract renewal

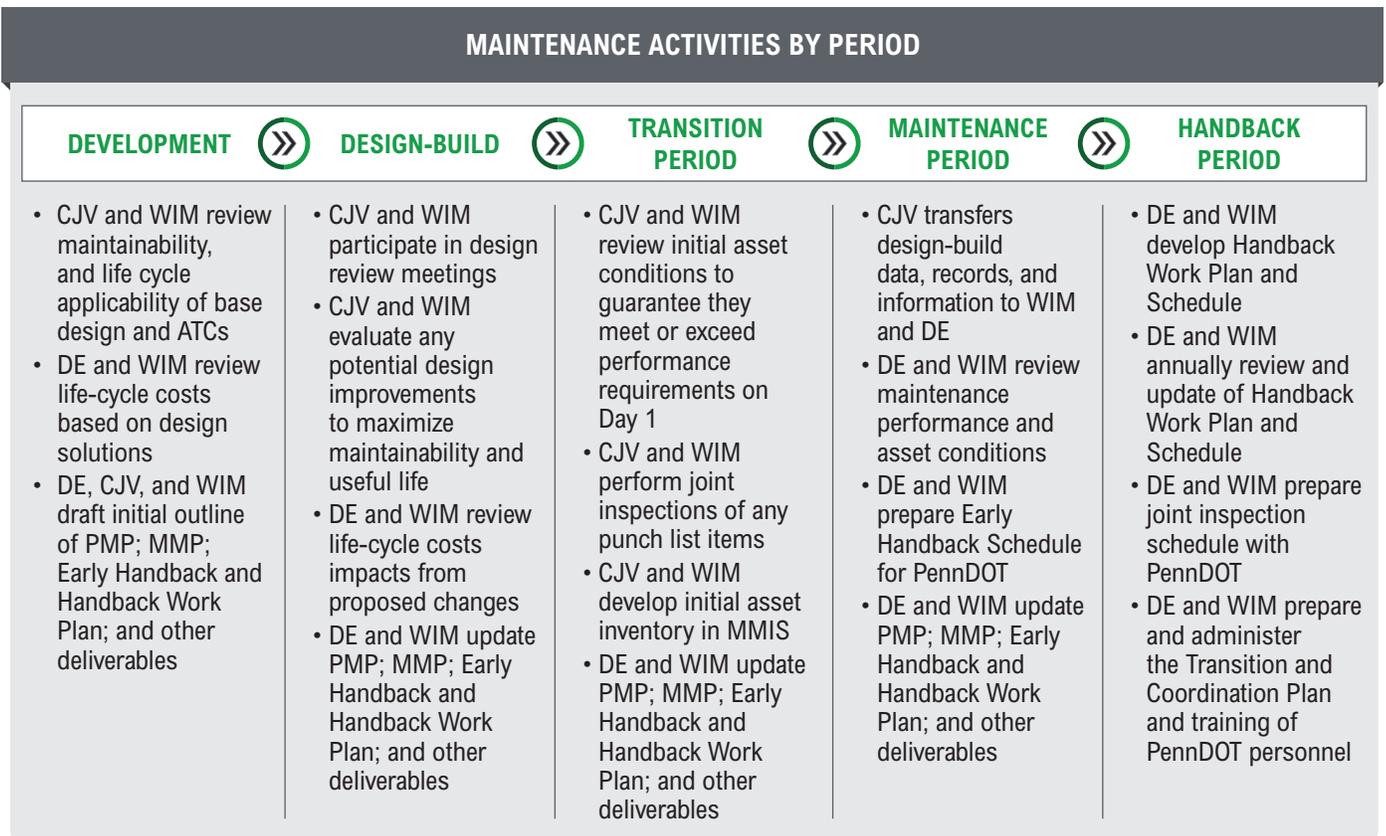
**TABLE 4.3-1 WORK TYPES**

WIM SELF-PERFORMED	SUBCONTRACTED
<ul style="list-style-type: none"> <li>» Sign repairs</li> <li>» Bridge joint repairs</li> <li>» Graffiti removal</li> <li>» Bridge washing</li> <li>» NBIS inspections</li> <li>» Non-NBIS Inspections</li> </ul>	<ul style="list-style-type: none"> <li>» Bridge deck overlays</li> <li>» Bridge bearing replacements</li> <li>» Rail repairs</li> <li>» Electrical maintenance</li> <li>» Underwater inspections</li> <li>» Bridge load ratings</li> </ul>

work using local subcontractors when cost effective. During the Maintenance Period, PWKP will continuously engage and stimulate the participation of DBE firms. Maintenance work will be carefully coordinated with the routine maintenance responsibilities retained by PennDOT.

**FIGURE 4.3-2 PWKP MAINTENANCE PERIOD INTERFACES**

PWKP’s team integrates design, construction, and maintenance to deliver a seamless Project to PennDOT.



## Decision-Making Process

Matters that have a direct impact on the Project will be reviewed jointly between the DE and WIM, represented by the Project Executive and the Operational Technical Support Team. Final decision authority belongs to the Project Executive and Board of Directors.



Decision making authority for day-to-day maintenance related matters, including administration and management of subcontractors, is the responsibility of the Maintenance Manager. Other Key Personnel will provide support and guidance for matters related to their fields.

Due to the geographical distribution of the assets, and the complex logistics necessary to deliver the Project's goals, WIM inspectors and maintenance technicians will be trained in best maintenance practices. This will allow for maintenance personnel to exercise good judgment while performing all necessary, routine maintenance work while on site.

Issues or disputes that cannot be resolved at a designated level will be quickly escalated to the next level for guidance and resolution, with the Project Executive having the final decision making authority.

## Internal Communication and Documentation

Quarterly review of monthly reports and joint meetings will be conducted to address specific matters and will track the progress and performance of the maintenance services.



The DE and WIM, represented by the Project Executive, and Maintenance Manager, with participation of the Operational Technical Support Team, will focus on:

- » Work plans
- » Meeting performance requirements
- » Condition of assets
- » Life-cycle performance
- » Budget
- » Unavailability and noncompliance events
- » Customer requests
- » Safety performance
- » Risk evaluations



### DAN GALVIN PUBLIC INFORMATION COORDINATOR

#### QUALIFICATIONS:

- 23 years of experience implementing and managing public involvement and communication programs for large geographic areas that include disparate stakeholder groups and concerns.
- Successfully managed public information programs for high visibility and controversial transportation infrastructure projects.
- On the \$420M I-64 Design-Build Project, Dan was the project spokesman, he regularly gave media updates and project tours to keep the public informed of progress and address construction related issues with nearby residents and the traveling public.

Additional meetings will be held between team members when necessary to address special events with significant impact on the Project, performance issues, scheduling, coordination, and etc.

## Public Information and Communications Approach for the Maintenance Period

Dan Galvin will serve as the Public Information Coordinator during the Maintenance Period, following principles and procedures consistent with those described in Section 4.6 Preliminary Public Information and Communications Plan, of this proposal.

The Public Information Coordinator, while not required for handling communications related to the day-to-day routine maintenance, will be active in providing support to the Maintenance Manager, and PennDOT, during management of emergencies and incidents with severe impact to the Project. Ceisler Media and Issue Advocacy will provide assistance to Dan for public information and community outreach.



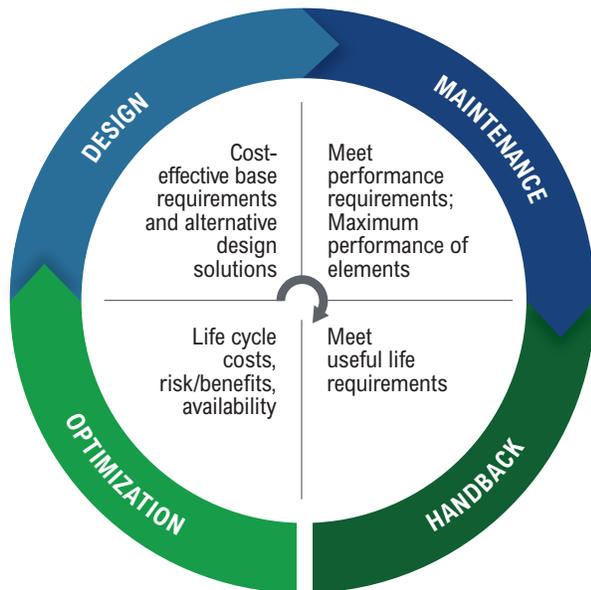
### WORKING TOGETHER

PWKP will coordinate planned maintenance work scheduling with PennDOT, government entities, utility owners, and third parties to identify possible conflicts prior to PennDOT's work submittal review in accordance with contract documents.

## MAINTENANCE MANAGEMENT PLAN (MMP)

PWKP’s whole-life maintenance strategy incorporates inspections, maintenance, and asset life-cycle management strategies into the design goals of the Project, shown in **Figure 4.3-3**.

**FIGURE 4.3-3 WHOLE-LIFE MANAGEMENT STRATEGY**



## Maintenance Management Information System (MMIS)

Knowing the assets, their history, needs, and expected and actual performance, is fundamental to plan and execute maintenance in a cost effective manner. Data needs to be accurate, relevant, accessible, and up-to-date. Prior to substantial completion of the first replacement bridge, PWKP will implement its MMIS that includes a detailed, asset inventory consistent with the requirements defined in Section 17.3 of the Technical Provisions (TP).



The MMIS will be PWKP’s primary tool for optimizing scheduling of inspections, routine maintenance, and renewal work, tracking deficiencies, controlling work execution process, and for tracking asset conditions and performance. The MMIS integrates defects, inspection forms, and activities (i.e. inspections, maintenance, repairs, and renewal work) and provides digital document management for subsequent analysis, maintenance planning, diagnosis, repair, fiscal planning, and non-compliance evaluation and reporting. In addition to the MMIS, PWKP will input inspection and performance data directly into



## KEY FUNCTIONALITIES OF PWKP’S MMIS

- ✓ Asset Inventory by type, condition, location
- ✓ Identify each Replacement Bridge by BRKEYS, MPMS, and S-Number
- ✓ Identify other elements by unique IDs
- ✓ Inspection scheduling and tracking
- ✓ Defect classification and maintenance/repairs
- ✓ Performance compliance
- ✓ Nonconformance status, history and corrective actions (repairs, renewals, replacements)
- ✓ Work schedules, and Work Orders
- ✓ Reporting of work accomplishments
- ✓ Preparation of schedules and budgets
- ✓ Resource management and analysis
- ✓ Final Maintenance Limit boundaries
- ✓ Management of spare parts inventory
- ✓ Data exports
- ✓ PennDOT will have access to the MMIS, and data will be stored and transferred to PennDOT

PennDOT’s BMS2 system in accordance with Pub 100A, as required in Section 17.3 of the TP.

## Approach and Utilization of PWKP’s MMIS

The MMIS will be PWKP’s primary tool to track, document and report asset performance and include data from NBIS inspections, condition assessments, incident and emergency inspections, maintenance and renewal work. This data will provide the basis of performance analysis. Performance will be evaluated against expected design performance to determine if assets are performing as expected. If projections predict future non-compliance events or safety risks, PWKP will complete corrective measures. If projections predict reductions to useful life, below the combined Term and handback requirement, the renewal work plan and schedule will be adjusted to meet the required useful life.

The MMIS has the necessary functionality to meet the requirements in Section 17.3 of the TP, and are illustrated on the following page, **Figure 4.3-4**.

**FIGURE 4.3–4 PWKP’S MMIS COMPONENTS**

## PWKP’S MMIS KEY COMPONENTS

PWKP’s MMIS is capable of handling multiple types of data and formats and will be the primary source of information used by PWKP to record performance and noncompliance points. Additionally, the MMIS will provide data quality and completeness; improved access to information for day-to-day maintenance records, data sharing, and customizable reporting capabilities.

### 1 INSPECTIONS

- Annual NBIS and non-NBIS inspections are done within inspection formats embedded into the MMIS
- Field devices have GIS interface and the capability of loading drawings and asset-specific documentation
- Formats are customizable according to the information needed and include but are not limited to: checklists, element ratings, type of asset, and geo-location data
- Inspection results can be used for analysis and comparison of element condition assessments, maintenance performance, and useful life determinations
- MMIS manages data of multiple types and formats and is capable of following AASHTO, NBIS, and other inspection reporting criteria
- PWKP will incorporate necessary data to support PennDOT’s maintenance rating requirements
- Inspection criteria and results will be generated in a report consistent with PennDOT’s standards

### 2 SCHEDULE

- For new activity set-up, users can define frequency of execution to create a reoccurring schedule
- Schedule can be assigned to a team or individual to track maintenance work progress

### 3 NOTIFICATIONS/SERVICE REQUESTS

- Created when defects are identified
- Defects may be priority 0, requiring immediate response
- Defects may be priority 1 for which an appropriate “next step” will be defined and scheduled
- All notifications are treated as defects, although some may be informational and not require action at that time
- PennDOT will access the MMIS and can create notifications directly within the system to enable accurate tracking of notification and treatment of non-compliant events

### 4 WORK ORDERS

- Can be created automatically from service defects, schedule activities, or manually for any activity
- Will be created for inspections, repairs, routine maintenance, or renewal activities
- Serve as the basis for controlling all information related to subsequent maintenance work to remedy deficiencies

### 5 WORK REPORTING

- Status and accomplishment of the work is tracked through a work reporting process
- Work reports are sequential – multiple work reports with increasing levels of completion can be created for a single work order until all work has been completed and the work order is closed
- Date and time of work completion is logged, distinct from when the work order is closed
- All reports permanently remain in the system for review

### 6 REPORTING

- Automatically generated by the system
- Customizable to meet specific needs
- Can include inspection forms, drawings, defect tables, photos, detailed comments, and maintenance activities
- Reporting required for submission to PennDOT will be generated automatically at the required frequency

### 7 TRACKING

- Progress status of service requests and work orders are created and notifications are routed to internal and external team members for performance tracking
- System can be adapted to provide future tracking
- Default values and field can be defined or changed
- Documents/drawings can be linked to assets, work orders/work reports/inspections

### 8 DOCUMENT MANAGEMENT

- Provides control of records, documents, policies, standards, and procedures for document control and data management
- Documents such as wiring diagrams, schematic drawings, instructions, procedures, drawings, specifications, records of inspections, assembly and disassembly drawings, material safety data sheets, and maintenance activities will be reviewed for accuracy, approved for use, controlled/distributed to those where work is performed
- PWKP will catalog and record existing procedures, reference specifications, standards/manuals, regulations including issue date and/or revision dates
- New reference documents/procedures will be added to the catalog

## Implementation of Maintenance Manual, Safety Plan, Transition and Coordination Plan, and Renewal Work Plan

The Maintenance Manual, Safety Plan, Transition and Coordination Plan, Renewal Work Plan, as well as the MMP, QMP, CEPP, SOPs, and Public Information and Communication Plan, will be developed collaboratively between the Maintenance Manager and supporting Key Personnel to guarantee that coherent principles are applied across these guiding documents, and that they address all contractual requirements. Maintenance staff will be trained on the content and requirements of these plans upon hire and annually thereafter. Fostering and reinforcing staff's understanding of the guiding principles for maintenance and renewal work, the safety of their execution, the quality to be delivered, and the goals to be met, will guarantee coordinated and consistent implementation during the Term. As part of the Transition and Coordination Plan, training will be provided to PennDOT staff on the content of these documents to ensure consistent implementation takes place after the expiration of the Term.

### Coordination and Interfaces

Prior to the commencement of the Maintenance Period, PWKP will update the Communications Plan, as necessary, as part of the Transition and Coordination Plan. PWKP will use this data during the development of the Transition and Coordination Plan, to actively pursue identification of all other entities that may be impacted by maintenance activities, with a particular focus on adjoining landowners, farmers, businesses, utilities, and residential areas.

The Customer Group database will contain triggers that specify why, when, and how each entity will be contacted. PWKP will flag each contact point according to the type and location(s) of maintenance activities that would affect Customer Group operations or property as well as any geographical limits that might impact the communication and coordination requirements. PWKP will contact these entities to verify information and maintain an accurate plan. New entities will be added when identified.

PWKP will plan and schedule maintenance work in coordination with PennDOT, governmental agencies, and affected third parties such as utility owners,

business owners, and local residents. PWKP will cooperate with these entities to minimize impacts and delays to Patrons, while still delivering a proactive and effective maintenance program for the assets.



PWKP will actively interface with other contractors to mitigate any conflicts with maintenance related activities. The Maintenance Manager will develop a checklist of contractors and construction projects that are working in the immediate vicinity of the planned work. These contractors will be notified in advance of the execution of work as part of the planning process and asked to confirm there is no conflict with their program.

PWKP will hold annual meetings within 30 days after submittal of the Maintenance Annual Report to review Project performance and the annual update to the Maintenance Management Plan. A mid-year meeting will be held to review performance and maintain alignment of priorities and a pre-winter meeting to coordinate efforts in preparing to successfully meet winter obligations. Additional meetings will be coordinated as needed to address performance issues, changes to renewal workplans, and to review proposed implementation of innovative maintenance solutions, materials or products.

During transitions at the start and end of the Maintenance Period, PennDOT will be frequently engaged to promote partnership, seamless transfer of duties of maintenance responsibilities, and necessary trainings. PennDOT and other affected agencies will be engaged to establish coordination protocols to be followed during the Term, in particular those related to work scheduling and emergency response.

### Monitoring, Inspecting, and Evaluating Project Conditions

Self-monitoring and self-reporting will take place on an annual basis. NBIS inspections for replacement bridges will be carried out every two years, complemented by non-NBIS condition assessments in the odd years. Condition assessments for non-bridge elements will be done every year.

Alignment with the Quality Management Plan (QMP), and access to the MMIS, will allow PennDOT to monitor PWKP's performance of maintenance activities. The QMP details the self-monitoring and self-reporting

requirements for inspection, data validation procedures, and tracking of nonconforming work.

**Self-Monitoring:** The purpose of the inspections will be to evaluate conditions of the assets, and compare their actual performance against their expected performance, based on design, weather, traffic, wear and tear, material life, and useful life of assets. When necessary to monitor Noncompliance Events, under-performing assets, or the performance of new materials, additional inspections will be programmed.



The QMP will support self-monitoring processes by incorporating data analyses to determine:

- » The frequency of inspections and routine Maintenance Work adequate to lead all assets to meet their performance requirements, and useful life expectations
- » Corrective measures to reduce recurrence of Noncompliance Events

**Self-Reporting:** The results of the annual inspections, and other intermediate inspections, will be available to PennDOT through the MMIS. These results will be reviewed by PWKP for proposal of corrective measures where needed, and self-assessment of non-compliance points, if applicable.

These results, and data, will become the basis for the preparation of the Maintenance Monthly Reports and

**EARLY DETECTION**

Spalls at beam ends, detected during a routine maintenance inspection, led to a deeper evaluation of the root cause of the issue.

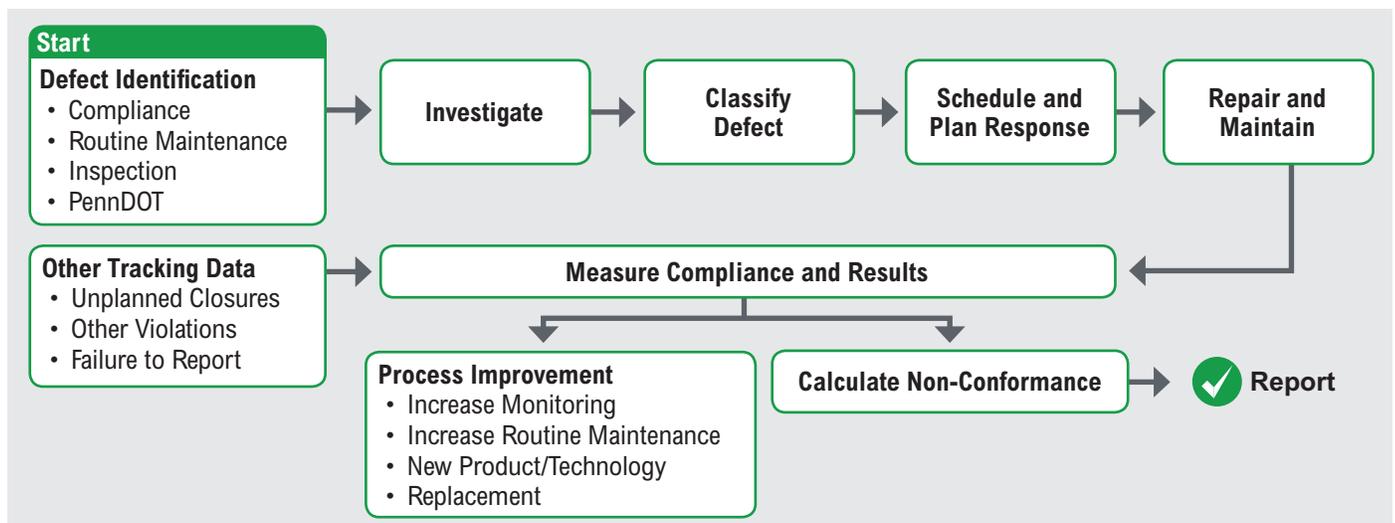


the Maintenance Annual Reports; as well as for preparation of maintenance work schedules, renewal work schedules, and handback work plan.

PWKP’s MMP will detail the procedures to address maintenance needs identified during inspections. **Figure 4.3-5** illustrates how deficiencies and noncompliance events will be evaluated to determine their root cause, and identify the potential for recurrence. The MMIS will be the repository of data and primary tool for these analyses. If a recurrence exists, PWKP will activate controls to eliminate or minimize the risk. Controls could include: increased frequency of inspection, different inspection techniques, replacement, new materials, or changes to SOPs, MMP or QMP.

**FIGURE 4.3–5 SELF-MONITORING AND SELF-REPORTING PROCESS FOR DEFECTS**

PWKP’s self-monitoring and self-reporting process guarantees that defects are detected and managed to meet performance requirements and proper asset management



## Approach for Achieving Maintenance Performance Requirements of Technical Provisions

A maintenance manual will be developed which will include the SOPs to be followed by maintenance personnel during the execution of maintenance work for each element. The SOPs will include:

- » Measurement thresholds, or performance target metrics, at which elements are not performing to the criteria set in Table 17-1 of the TP, or per applicable PennDOT Publications
- » Specific threshold measurement procedures
- » Minimum frequency of inspections
- » Best industry practices for the execution of preventive maintenance work
- » Reporting of deficiencies and noncompliance
- » Best industry practices for corrective maintenance work to address deficiencies or noncompliance
- » Safety practices
- » Environmental protection concerns
- » QA/QC procedures
- » Use of the MMIS for recording inspection observations, schedule work, and report executed work

## Approach for Corrective and Preventative Actions

The MMP will include the procedures to address the different maintenance needs identified during inspections, or reported by PennDOT or third parties. The nature of the need will determine the steps to be taken. Deficiencies, noncompliance, damages, emergencies, incidents, and extreme weather events are different, and require different approaches. Their individual procedures will have the follow common steps:

- » Recording the identification of the issue in the MMIS (reporting entity, individual, time, date, location, asset, and type of issue)
- » Investigation of reported issue (time frame based on severity)
- » Determination of whether the issue represents an immediate hazard to Patrons, compromises the integrity of a structure, and functionality of an element
- » Scheduling & execution of corrective work
- » Data analyses to determine the root cause of the issue
- » Adjust SOPs and work plans, if needed

## Emergencies, Incidents, and Extreme Weather Events

PWKP will use three-step approach to coordinate with PennDOT on emergencies, incidents, and extreme weather:

1. Early multi-agency coordination efforts, with protocols designed to address these events in a coordinated manner
2. Communication during the event, allowing all parties to make the best decisions and return the assets to safe usage as soon as possible
3. Post event debriefs to allow agencies to evaluate the response efforts and agree on improvements to future responses.

### EMERGENCY AND INCIDENT EXAMPLE

WIM personnel are experienced in assessing damages from multiple types of incidents, such as barrier damage caused from a rush-hour accident.



## Minimizing Risk to Public and Property

PWKP’s Safety Plan will include a risk matrix for the Maintenance Period, with an analysis of the probability and severity of the risks, and the controls to minimize the impact of harm to individuals and property. The SOPs will describe the safety risks associated with each activity, and will specify the necessary safety measurements before executing the activity and the controls to mitigate those risks. Risk and safety requirements will be reviewed and considerations made to execute the work during times, days and seasons of less impact to traffic and Patrons, whenever possible. The use of Job Hazard Analysis for high risk and special operations, Job Task Analysis for daily tasks, weekly tool box talks, and monthly safety meetings will be used to reinforce good safety practices, in particular those associated with traffic control since this will be the most frequent impact with safety risks to Patrons during the Maintenance Period.

## Preventing Encroachment Onto Third Party Property

PWKP does not foresee encroachment on third-party property as a result of planned maintenance work. PWKP will use traffic control to avoid use of private property, and stage equipment and materials within the maintenance limits outside of the clear zone when possible. When this is not possible, PWKP will transport materials and equipment to and from local vendor/subcontractor sites as needed.

## Training Program for Maintenance Personnel

The Maintenance Manager, Inspectors, and maintenance technicians are trained in the use of the EDMS and MMIS. The MMIS training will also be extended to PennDOT personnel. WIM Inspectors are trained and certified as bridge safety inspectors by PennDOT, and will have passed PennDOT’s PA CoRe Assessment Class. In addition, trainings necessary for routine inspections and maintenance work will be administered to the inspectors and maintenance technicians. This includes topics such as: performance requirements, defect identification and categorization, element-specific manufacturer manuals, applicable PennDOT publications, best maintenance practices, standard operating procedures, and quality of work.

**TABLE 4.3-2 PWKP’S MAINTENANCE SAFETY TRAINING PROGRAM**

PWKP’s training program supports continuous improvement.

<b>NEW EMPLOYEE</b>	<ul style="list-style-type: none"> <li>» Personal Protective Equipment</li> <li>» Five-Part Drug and Alcohol-Free Work Place Program</li> </ul>
Prior to Beginning Work	<ul style="list-style-type: none"> <li>» Near Miss Reporting</li> <li>» Hazard Communication</li> <li>» Driving Safety Awareness</li> <li>» First Aid/CPR</li> <li>» Maintenance of Traffic (MOT)</li> <li>» HAZMAT Awareness</li> </ul>
<b>PROJECT SPECIFIC ORIENTATION</b>	<ul style="list-style-type: none"> <li>» Work Zone Safety Awareness</li> <li>» First Responder</li> <li>» Hazard Communication</li> </ul>
Mobilization Period	<ul style="list-style-type: none"> <li>» National Traffic Incident Management</li> <li>» Advanced MOT</li> <li>» Environmental Awareness &amp; Compliance</li> </ul>

PWKP’s maintenance personnel will be trained, under the direction of the Environmental Compliance Manager, on environmental awareness and environmental compliance specifically applicable to the environmental sensitivities of the Project. This training will address subjects such as bridge washing, spill response, waste management, and threatened and endangered species.

Maintenance staff will be trained by certified trainers in emergency and routine traffic control operations, Occupational Safety and Health Administration requirements, first aid, and hazardous material (HAZMAT) mitigation. A more comprehensive list of safety trainings is provided in **Table 4.3-2**.

## Traffic Management and Control During Maintenance Period

Maintaining a continuous flow of traffic, providing a safe roadway, and maintaining the assets with minimal disruption to the traveling public are key goals to PWKP. The management of temporary traffic control while meeting those challenges is critical to the success of the project.

**Planned Lane Closures:** PWKP will focus on traffic management by adhering to its comprehensive Traffic Management Plan (TMP). As part of the overall TMP, the entire project will be evaluated and

individual bridge specific traffic control plans (TCP) from the construction phase will be utilized to develop the bridge specific TCP's for the maintenance phase. These TCP's will be submitted to PennDOT for review and approval within the allowed time frames. Specifics include:

- » Local authorities consulted for lane closures within their governing area
- » Maintenance lane closures of 24 hours or more will follow the Construction Period closure requirements
- » Maintenance closures of less than 24 hours will adhere to standards, procedures, and traffic control devices outlined in PennDOT Publications 46, 111, 212, 213, 408 and the MUTCD
- » Any additional lane closure restrictions set forth in TP Section 16 – maintenance and protection of traffic will also be included.

Maintenance staff will be trained and experienced in routine traffic control operations and safety, including the proper installation, maintenance, and removal of traffic control devices. Lane closures will be scheduled outside of peak hours, holidays, and special events to reduce traffic delays and increase safety. PWKP will work closely with PennDOT during all lane closures.

The initial schedules of proposed closures for maintenance work and renewal work will be delivered to PennDOT for approval within 30 days of issuance of NTP1, and a review of this within 90 days after the issuance of NTP1.

Annually, within 30 days prior to the start of the calendar year, updated schedules will be delivered as part of the annual updates to the Maintenance Management Plan and Renewal Work Plan. If necessary, other updates will be submitted throughout the year to reflect changing conditions, and developed in cooperation with PennDOT and other affected governmental entities and third parties. Once approved by PennDOT, other affected agencies will be contacted to confirm PWKP's work schedules.



At the beginning of every month, PWKP will notify PennDOT of any closures scheduled for that month and the following month, and confirmation will be provided to other affected governmental entities and third parties to verify that no new schedule



## REDUCE IMPACTS TO STAKEHOLDERS

PWKP provides the following traffic control considerations for planned maintenance work:

- PennDOT will be notified of all planned maintenance closures for the current the following month
- Closure submittals for planned maintenance will include details of the nature and duration of the closure and proposed traffic control plans
- Planned maintenance closures will not be scheduled on a calendar event
- No closures shall restrict all travel lanes of a Replacement Bridge maintenance needs
- When necessary, temporary access will be provided for planned maintenance affecting businesses, residencies, and other stakeholders

overlaps develop. If changes need to be made for an approved closure, PennDOT will be notified at least 14 days before the new proposed closure date, and other governmental entities and third parties will be contacted to review potential work schedule overlaps.

The Maintenance Manager will provide PennDOT with lane closure information for any closures. A trained and certified traffic control supervisor will monitor traffic control plans, setups, maintenance, and removal.



Maintenance Work needs will be scheduled to minimize delay to the traveling public and other contractors working in the vicinity. PWKP recognizes the need to develop a sense of “ownership” for the assets it will be managing, which will involve staying current with developments and knowing who the relevant stakeholders are in any given situation.

PWKP will keep a list of contact information for government entities, utility owners, businesses and other third parties that could be impacted. This list will be updated every six months. When maintenance work has an impact on normal access to nearby businesses and residences, temporary access will be provided by following the pre-approved traffic control plans for those locations.

**Emergency Closures – Emergencies and Incidents:** Maintenance staff will be trained in emergency traffic control operations and be experienced in the

proper installation, maintenance, and removal of traffic control devices. If maintenance personnel are first on site, they will implement PWKP’s Emergency Management Plans to protect the public, maintain traffic, and provide access to emergency responders.

PWKP will work closely with PennDOT during emergency lane closures so that assets are returned to a safe operating condition as soon as possible.

1. First on site, PWKP will immediately implement an emergency lane closure or any action necessary to mitigate the hazard of a defect or hazard that would compromise the safety of Patrons.
2. PWKP will notify PennDOT of the circumstances of each emergency closure
3. PWKP will coordinate with other relevant agencies impacted by the closure

To address response times for implementation of traffic controls, PWKP will rely on supporting traffic control subcontractors throughout the state to provide stand-by services and deploy resources to an incident site to be there on time. PWKP’s resources will immediately mobilize to the site to perform their duties. When necessary, pre-approved detour plans will be activated, and communication with PennDOT’s Traffic Management Center will be established to keep Patrons safe and informed.

**Closures:** As part of the monthly reporting cycle, PWKP will provide a summary of lane closures during the previous month and planned closures for the upcoming two months. A log of all closures will be maintained throughout the Maintenance Period, which will include the purpose, date, time, location, and duration; categorized as follows:

- » Emergency closures
- » Closures for inspections
- » Closures for routine maintenance work
- » Closures for renewal work
- » Summary of scheduled closures for the next two months

### Minimizing Environmental Impacts

PWKP will comply with the Comprehensive Environmental Protection Plan (CEPP) throughout the Maintenance Period, updating it as necessary. General considerations for environmental protection measures can be seen on **Table 4.3-3**.

**TABLE 4.3-3 EXAMPLES OF ENVIRONMENTAL PROTECTION MEASURES**

PWKP will incorporate measures to ensure that impacts to the environment are minimized during the execution of maintenance work and renewal work.

ACTIVITY	ENVIRONMENTAL CONSIDERATION
Bridge washing	<ul style="list-style-type: none"> <li>» Erosion control devices will be installed to protect streams from incursion of solid particles and debris carried by runoff</li> </ul>
Herbicide application	<ul style="list-style-type: none"> <li>» Spill kits will be on-site to contain unintentional releases</li> </ul>
Graffiti removal	<ul style="list-style-type: none"> <li>» Paint materials will not be transported into the stream</li> <li>» Tarps available if necessary for painting over streams</li> <li>» Spill kits will be on-site to contain unintentional releases</li> </ul>
Slope / Embankment repairs	<ul style="list-style-type: none"> <li>» Erosion control devices will be installed to protect stream when repairing slope washouts or restoring embankments</li> </ul>
Bridge deck overlay	<ul style="list-style-type: none"> <li>» Erosion control devices utilized to control runoff from blasting operations to remove overlays</li> <li>» Scuppers will be plugged to avoid release of contaminants into streams and embankments</li> </ul>
Flexible pavement repairs	<ul style="list-style-type: none"> <li>» Erosion control devices will be installed to control spills</li> <li>» Scuppers will be plugged to avoid incursion of debris and asphalt</li> </ul>

In coordination with emergency services, and any other relevant authority, maintenance staff will prepare a Waste Management Plan, and a Spill Response Plan, that will be used when managing unplanned incidents associated with contaminated materials during maintenance work. These Plans will identify key personnel, contact information, required equipment, and define procedures including safety, identification, traffic control, containment, assessment, communications, contingency plans, and reporting.

The CEPP shall ensure that the environment is protected during the Term, and that negative impacts are controlled or mitigated as required by the agreements and regulations.

## Specialized Maintenance Equipment



Maintenance Work trucks will be designed and equipped to enable on-the-road maintenance, and to implement traffic control. Vehicle specifications include vehicle-mounted illumination, signal and communication devices, programmable arrow board, high intensity roof mounted warning light bars, and secure storage areas for tools and traffic control devices. PWKP will use a combination of owned, rented, and subcontractor operated equipment to execute maintenance work and renewal work, as seen in **Table 4.3-4** and **Figure 4.3-6**.

### Approach to Maintenance Spare Parts Supply and Management

Prior to the Maintenance Period, PWKP will develop an asset register which captures all assets within the maintenance limits. This asset register will form the basis of the MMIS’s inventory management module. The asset register will incorporate all Project elements and will cross-reference each to the product data information compiled during the Design and Construction Periods. This process ensures that trends of high usage are identified early by management, and stock levels can be adjusted accordingly.

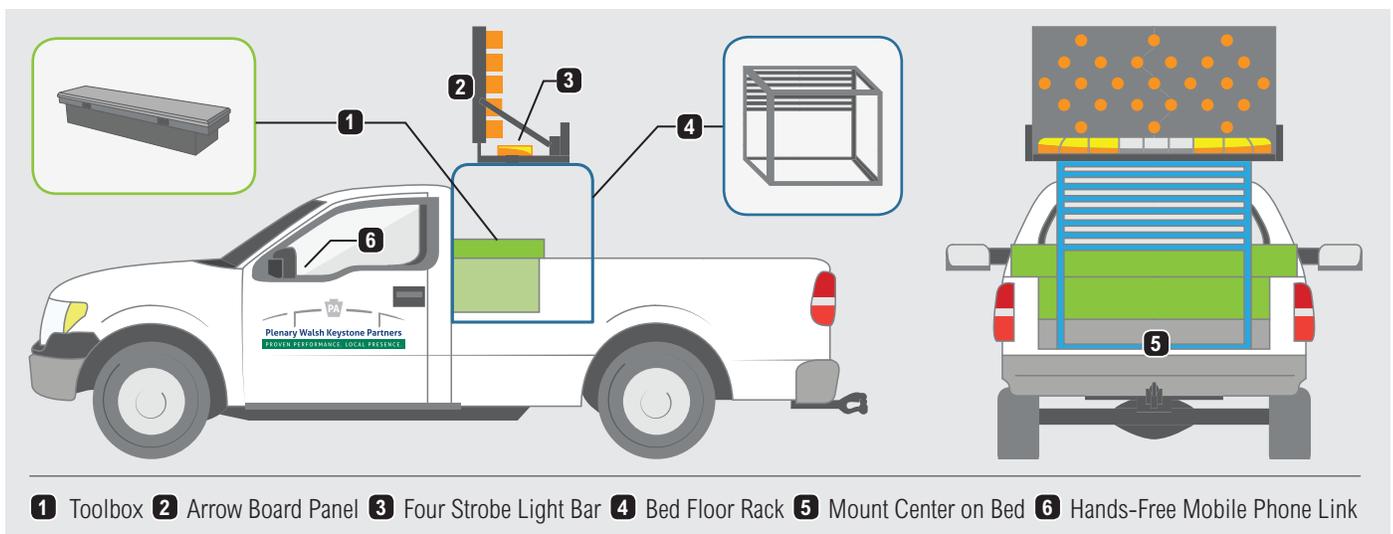
The inventory will include a complete list of parts with current supply sources. Prior to purchase and storage, product quality will be checked and verified

**TABLE 4.3-4 SPECIALIZED MAINTENANCE EQUIPMENT**

	TYPE	ACTIVITY
OWNED EQUIPMENT	Pick-up Trucks	<ul style="list-style-type: none"> <li>» Inspections</li> <li>» Most routine maintenance (e.g. small signs, weeding, graffiti, pothole patching)</li> </ul>
	Utility Trailer	<ul style="list-style-type: none"> <li>» Traffic control</li> <li>» Concrete repairs</li> <li>» Removal / disposal of debris from embankment</li> </ul>
	Message Board	<ul style="list-style-type: none"> <li>» Traffic Control</li> </ul>
	Arrow Board	<ul style="list-style-type: none"> <li>» Traffic Control</li> </ul>
	Bridge Washing Rigs	<ul style="list-style-type: none"> <li>» Bridge deck washing</li> <li>» Bearings washing</li> </ul>
RENTED EQUIPMENT	Crash Trucks	<ul style="list-style-type: none"> <li>» Traffic Control</li> </ul>
	Man-Lift	<ul style="list-style-type: none"> <li>» Lighting</li> <li>» Large / overhead signs</li> <li>» Superstructure inspections</li> <li>» Superstructure repairs</li> </ul>
	Vacuum Truck	<ul style="list-style-type: none"> <li>» Storm drain cleaning</li> </ul>
	Snooper Truck	<ul style="list-style-type: none"> <li>» Bridge inspections</li> <li>» Superstructure repairs</li> </ul>
	Dump Truck	<ul style="list-style-type: none"> <li>» Removal / disposal of debris from embankment</li> </ul>

**FIGURE 4.3-6 TYPICAL MAINTENANCE TRUCK**

Typical maintenance units are setup to facilitate mobility and autonomy of maintenance work, and traffic control.



**TABLE 4.3-5 INVENTORY EXAMPLES OF MAINTENANCE SPARE PARTS AND SUPPLIES**

<b>CRITICAL LONG LEAD TIMES</b>	<b>NON-CRITICAL READILY AVAILABLE</b>
<ul style="list-style-type: none"> <li>» Regulatory Sign Panels</li> <li>» Sign Posts, Hardware, Bases</li> <li>» Attenuator: Full Assembly</li> <li>» Attenuator: Components</li> <li>» Replacement Lamps</li> <li>» Cold Patch</li> <li>» Hazmat kits</li> <li>» Traffic Control</li> <li>» Erosion Control Devices</li> </ul>	<ul style="list-style-type: none"> <li>» Graffiti Removal Products</li> <li>» Paints</li> <li>» Joint Sealers and Backer Rod</li> <li>» Seed and Straw</li> <li>» Herbicides</li> <li>» Epoxy</li> </ul>

in accordance with manufacturer data. Maintenance staff will control the receipt and issue of products and monitor and assess the condition of the stock inventories to ensure products are suitable for use.

Critical spare parts, and frequently used materials with long lead times, will be stored in locations throughout the state to facilitate prompt access by maintenance personnel in order to meet defect cure times. Non-critical spare parts are readily available products and will be purchased as needed at local vendor sites. This process ensures that trends of high usage are identified early by management, and stock levels can be adjusted accordingly.



Where shelf life is a critical factor, products will be issued on a first-in/first-out basis.

**Table 4.3-5** shows examples of expected spare parts and materials to be stocked for the Project.

### Incorporating Audit Findings

PWKP’s audits will be done with the objective of ensuring that the applicable plans for the Maintenance Period are being followed correctly and to verify if their application is yielding the desired quality, safety, and performance results in the delivery of maintenance services, and conditions of the assets. PWKP recognizes that from time to time, PennDOT or FHWA might exercise their authority to perform audits to the Project, and will collaborate with these processes.

The results of these audits will be utilized to make corrections to plans, processes, and maintenance practices if deficiencies are encountered. PWKP’s audit findings

will be incorporated as lessons learned in updates to plans and trainings to avoid recurrence of deficiencies and to promote repetition of good practices.

### ROUTINE AND PREVENTIVE MAINTENANCE PROGRAM

PWKP’s Project’s maintenance program is focused on the continuous assessment of asset conditions, achieved through the bi-annual NBIS inspections and annual condition assessments. These inspections will guarantee that each replacement bridge and other elements are visited at least once per year. More frequent inspections might be programmed when needed to monitor the evolution of a specific condition, or the performance of an innovative maintenance solution.

The results of these inspections will provide the data required to schedule maintenance work. Maintenance personnel will be equipped, trained and ready to perform basic maintenance work while on site performing the inspections. Such work might include:

### Maintaining Project Assets During Construction

The Construction Joint Venture (CJV) will perform maintenance operations at each replacement bridge location from NTP3 until substantial completion, at which time the Maintenance Period will begin. During the Construction Period, routine maintenance activities are anticipated to be minimal. Walsh, Granite, and exclusive subcontractors have extensive experience in maintaining bridge and highway elements during construction.

PWKP recognizes that at locations utilizing staged construction, certain parts of the existing bridge carrying traffic may require maintenance. The existing bridge will be monitored during construction, and any routine maintenance required to safely accommodate traffic on the existing bridge will be performed. Miscellaneous routine maintenance will be executed by the CJV’s subcontractor working at the bridge.

The project assets will be maintained by the CJV with workforce and motorist safety in mind and will be required to turn over the site to WIM in a completed condition. The Maintenance Period will start off with a site that has no original maintenance issues. During

the Construction Period, the CJV will be responsible of the following:

- » When ice and snow may accumulate, the contractor or subcontractor performing the work is responsible for the removal within the portion of the work site closed to traffic. Care will be taken to ensure safe passage within the work site and ensure adjacent travel ways are not affected.
- » The CJV will be responsible for populating the MMIS with the initial asset inventory records, and any necessary changes to the information until transition to the Maintenance Period. WIM will assist the CJV by providing training on the use of the MMIS, and validating the populated data during the Transition Period for each bridge site.
- » PWKP will perform all previously scheduled NBIS bridge inspections occurring in the period between NTP3 and substantial completion. Inspections will be coordinated by the Regional Construction Manager and be performed by staff from HDR, Larson or subcontracted as necessary.

### Minimizing Life-cycle Costs of the Replacement Bridges

Using the results of life-cycle and deterioration-based analyses, the renewal program will be adjusted annually to best address the maintenance needs and to meet the performance and handback requirements while minimizing disruptions to traffic. **Table 4.3-6** shows PWKP’s design choices that will reduce life-cycle costs for replacement bridges.

**TABLE 4.3-6 DESIGN CHOICES FOR REDUCED LIFE-CYCLE COSTS FOR REPLACEMENT BRIDGES**

<b>BRIDGE DECK OVERLAYS</b>	<ul style="list-style-type: none"> <li>» Impermeability reduces costs from corrosion induced damages</li> <li>» Durability eliminates costs of intermediate overlays</li> <li>» Longevity of skid resistance reduces costs</li> </ul>
<b>PWKP’S DESIGN: HMWM + POLYESTER POLYMER CONCRETE</b>	
<b>BRIDGE JOINTS</b>	<ul style="list-style-type: none"> <li>» Reduces costs of installation and replacements</li> <li>» Reduces costs of superstructure maintenance associated with leakage of corrosive and abrasive substances</li> </ul>
<b>PWKP’S DESIGN: ELIMINATION WHERE POSSIBLE</b>	
<b>BRIDGE DECK SCUPPERS</b>	<ul style="list-style-type: none"> <li>» Reduces costs of installation and maintenance</li> <li>» Reduces costs of bridge washing</li> <li>» Reduces costs associated to scouring at outlets</li> </ul>
<b>PWKP’S DESIGN: ELIMINATION WHERE POSSIBLE</b>	
<b>CULVERTS</b>	<ul style="list-style-type: none"> <li>» Minimized scouring</li> <li>» No beam, or bearing, maintenance</li> <li>» Less susceptible to salt damage</li> </ul>
<b>PWKP’S DESIGN: MAXIMIZE USE OF CULVERTS</b>	
<b>BRIDGE BEAMS</b>	<ul style="list-style-type: none"> <li>» Simple on-site repairs when damaged</li> <li>» Less painting</li> <li>» Less corrosion damage</li> </ul>
<b>PWKP’S DESIGN: MAXIMIZE CONCRETE; MINIMIZE STEEL</b>	

### Description and Schedule of Planned and Preventive Maintenance

PWKP’s schedule of planned and preventive maintenance, and renewal work are based on the principal of maximizing and monitoring of asset conditions and preventive routine maintenance with low impact on availability to Patrons. The schedules are flexible to adapt to the logistics of managing multiple assets statewide, and the changing needs and performance of assets over 25 years. **Figure 4.3-7** shows PWKP’s preliminary routine maintenance work and renewal work schedules while **Figure 4.3-8** illustrates PWKP’s approach to the handback schedule.

PWKP’S WHOLE-LIFE COST ANALYSIS AND OPTIMIZATION TECHNIQUES

- Expected useful life of the asset or element
- Routine maintenance costs (including costs for adjustments)
- Durability of materials and specifications
- Cost to repair / replace an element, particularly regarding any future price volatility
- Handback requirements
- Whole-life expectations

**THREE PRINCIPLES OF PWKPS' REHABILITATION AND REPLACEMENT PROGRAM**

**PWKP's rehabilitation/replacement program principles include:**

- + Life cycle and Handback requirements are incorporated into the design.
- + Construction techniques ensure that materials and products will meet their designed life.
- + A proactive routine Maintenance Program designed to allow assets to meet their design life.

**FIGURE 4.3-8 PWKP'S HANDBACK SCHEDULE**

PWKP's Handback Schedule will deliver assets in good conditions to maintain reasonable maintenance efforts for PennDOT.

**HANDBACK PLAN**

- Submitted to PennDOT no later than 12 months prior to the commencement of the Handback Period
- Procedures and schedules for the assessment of Project Element conditions
- Final Useful Life calculation
- Scope/schedule of Final Useful Life testing, and acceptance procedures testing
- Actual costs of Work performed in previous Handback years; estimated cost of remaining Handback Work
- Schedule of joint Handback inspections

**HANDBACK INSPECTIONS**

- Mutually agreed schedule for joint inspections between PWKP and PennDOT (no less than annual)
- Monthly notifications of scheduled inspections
- Delivery of inspection reports, testing results, and interpretation of data within 10 days
- Final NBIS inspections less than 6 months before Handback Date

**RENEWAL WORK SCHEDULE**

- Annual delivery of updated Work Schedules
- A brief description of the type Renewal Work anticipated to be performed
- The estimated cost in current dollars of such Renewal Work
- Report on progress and effectiveness of Maintenance Work
- Actual work performed in the previous year and planned work for the remaining year
- Asset performance analyses

**TRANSITION AND HANDBACK TO PENNDOT**

**SCHEDULE LEGEND**

- Inspections/Assessments
- Non-Bridge Elements
- Bridge Elements
- Early Handback Elements
- Renewal Work

**FIGURE 4.3-7 PWKP'S PRELIMINARY ROUTINE MAINTENANCE WORK AND RENEWAL WORK SCHEDULE**

Inspections and most Routine Maintenance Work are planned to be done concurrently to optimize the use of resources while visiting every Replacement Bridge site. As a result of PWKP's choice of design features, products, and materials, minimum Renewal Work is expected for the Project.

MAINTENANCE WORK GROUP/ACTIVITY	FREQUENCY	MONTH →	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
<b>INSPECTIONS AND ASSESSMENTS</b>														
NBIS Inspections	Every 2 Years													
Non-NBIS Condition Assessment for Bridge Elements	Every 2 Years (Odd Years)													
Condition Assessment for Non-NBIS Elements	Annual													
Load Rating Assessment	Per FHWA Requirements													
Underwater Inspections	Every 4 Years													
<b>ROUTINE MAINTENANCE WORK: NON-BRIDGE ELEMENTS</b>														
Repair Unpaved Shoulders and Slopes	Annual													
Sign Repair (Panel, Hardware, Post, Base)	As Required Per Damages													
Sign Panel Cleaning	Annual													
Guardrail/Attenuator Repairs	As Required Per Damages													
Sidewalk/Curb and Gutter Repairs	As Required Per Damages													
Fence Repair	As Required Per Damages													
Graffiti Removal	As Required Per Damages													
Clean Ditches/Drainage Structures	Annual													
Repair Ditches/Drainage Structures	As Required Per Damages													
Debris Removal from Embankments	Annual													
Highway Lighting Maintenance and Repairs	As Required Per Damages													
<b>ROUTINE MAINTENANCE WORK: BRIDGE ELEMENTS</b>														
Deck Washing	Annual													
Bearings Washing	Every 5 Years													
Scuppers Inspections and Cleaning	Annual													
Deck/Approach Slabs Patching	As Required Per Damages													
Cracks/Spalls on Superstructure/Substructure	Annual													
Bridge Rail/Parapet Repair	As Required Per Damages													
Retaining Wall Repair	As Required Per Damages													
Physical/Chemical Weed Control	Annual (Min. Use of Herbicide)													
<b>ROUTINE MAINTENANCE FOR EARLY HANDBACK ELEMENTS</b>														
Mowing/Landscape Maintenance	As Needed for Establishment													
Pavement Patching/Shoulder Edge Loss Repair	As Required Per Damages													
Pavement/Shoulder Repair (Hot Mix)	As Required Per Damages													
<b>RENEWAL WORK GROUP/ACTIVITY</b>														
Corrosion Protection for Steel Beams (Galvanized)	At Beam Ends													
Epoxy Overlay	If Required for Final Useful Life													
Joint Sealing	Additional to Address Issues													
Elastomeric Bearings	If Deficient at Handback													
Repair Deteriorated Concrete on Beams	If Deficient at Handback													
Repair Substructures	If Deficient at Handback													
Storm Sewer, Ditches, Inlets, Corrugated Steel	If Deficient at Handback													
Manhole Covers, Grating, Frames and Boxes	If Deficient at Handback													
Traffic Signal Housing and Mounting	If Deficient at Handback													
Earthwork Slopes	If Deficient at Handback													
Sign Panels	For Reflectivity													
Luminaires (Pole Mounted and Underdeck)	Useful Life Restoration													
Guardrail	If Deficient at Handback													
Impact Attenuators	If Deficient at Handback													
Concrete Barrier	If Deficient at Handback													
Lighting Columns; Overhead Signs; Sidewalks; Curbs/gutters; Sign/Signal Gantries; and Retaining Walls	If Deficient at Handback													

## Approach to Preventive Maintenance



Proactive routine preventive maintenance practices consistently prove to be the most cost-effective means of asset management. The goal is to avoid or reduce costly and disruptive corrective maintenance work throughout the life of an asset to help the assets meet their useful life. PWKP's MMP contains two main focus areas related to prevention: condition inspections, and routine maintenance work.

**Inspections:** Monitoring the conditions of assets is the most important function to guarantee that there is a clear understanding of performance and a realistic understanding of work required and life expectancy. NBIS inspections performed biannually, condition assessment of bridge elements in between NBIS inspections, and annual condition assessments of non-bridge elements, will be scheduled for all replacement bridge sites to facilitate the early detection of deterioration of assets, so that preventive work can be programmed and executed before turning into defects.

**Routine Maintenance Work:** Most routine maintenance work will be executed simultaneously with the bridge inspections. Defects, or potential defects, that cannot be addressed during the inspection will be documented and scheduled to be corrected within the cure periods indicated in Table 17-1 of the TP when practical. PWKP's identified scopes of work needed during the maintenance period includes:

- » Annual bridge deck washing
- » NBIS or non-NBIS condition assessments
- » Tighten and replace missing hardware on signs and structural elements
- » Bearings, washing every 5 years
- » Remove graffiti
- » Apply touch-up galvanizing paint to protect elements from rust and scratches
- » Vegetation maintenance for early handback
- » Pot hole patching

## RENEWAL WORK PROGRAM

### Rolling Program of Major Maintenance Repairs and Replacements

The rolling program of major maintenance and replacements is contained in the Renewal Work Plan, addressing early handback elements and the handback

period. It focuses on cyclical renewal works, based on the life expectancy of assets as established by design or manufacture parameters, and deterioration-based renewal works, resulting from actual performance of assets as identified during inspections. Needs analyses based on these types of renewal works are the basis for the renewal work schedule, which is adjusted annually (or more frequently if needed) to reflect the best approach to address handback requirements, and whole-life expectations for the assets.

No later than nine months before the early handback date, PWKP will submit to PennDOT a handback Workplan for the early handback elements associated with flexible pavements. Starting on the fourth year prior to the handback period, the renewal work schedule will reflect expected renewal work for that period, and the handback work plan will begin to be developed for submittal to PennDOT no later than twelve months prior to commencement of the handback



### MINIMIZING RENEWAL WORK

PWKP will carry out renewal work while maintaining safe and available assets and minimizing disruptions by ensuring that:

- + Life cycle and handback requirements are incorporated into the design.
- + Materials and products are selected to deliver the maximum durability, in a cost-effective manner.
- + High quality construction techniques used to install materials and products to construct elements that meet their expected useful life.
- + A proactive routine maintenance program is designed to allow the assets to meet their useful life.
- + Design and manufacturer parameters, traffic, and weather patterns, are used to design the initial Renewal Work Plan Schedule.
- + Inspection data used to analyze actual performance of assets, and if they will meet their useful life.
- + New materials, products, techniques, innovations, and best maintenance practices are researched and adopted to improve performance of assets.
- + Renewal work plan and renewal work schedule are adjusted as necessary to meet handback requirements and whole-life expectations.

period, to include all content required under Section 17.8 of the TP.

The annual renewal work schedule establishes replacement, renovation, and rehabilitation work planned for the next five-year period, identifying a daily resolution for the first two years, and a monthly resolution for the following three years, with project-specific commitments to be accomplished, most notably the expected impacts on traffic and the interface with other work being planned by PennDOT, other government agencies, utility owners, and other affected third parties. The renewal work schedule will be developed in cooperation with these agencies.

**Basic content of handback work plan:**

- » All replacement bridges and Project elements within the maintenance limits
- » Calculation of handback amounts, and handback reserve amount
- » Proposed use of handback reserve amount
- » Procedures and tests to determine element condition, performance, and useful life
- » Useful life calculation methodology
- » Acceptance criteria, and acceptance methods
- » Schedule of maintenance, and renewal work
- » Schedule of joint inspections with PennDOT
- » Phased transition of maintenance responsibilities to PennDOT
- » Training of PennDOT staff

As-built records, CS-4171 materials certification, inspections and maintenance reports, will be documented, organized, and archived within the EDMS and MMIS for proper transfer of data to PennDOT can take place during the Handback Period.

**Preliminary Renewal Work Schedule**

The scheduling strategy will constantly be under review to maintain the project assets. PWKP will continually review and refine the renewal work schedule to incorporate asset deterioration and impacts of ongoing maintenance work. Design criteria will be evaluated against actual performance to new or ongoing design work. **Table 4.3-7** lists the scheduling parameters in which PWKP operates under for renewal work.

**TABLE 4.3-7 SCHEDULING PARAMETERS FOR RENEWAL WORK**

<b>INITIAL RENEWAL WORK SCHEDULE</b>	<ul style="list-style-type: none"> <li>» Design Useful Life</li> <li>» Manufacturer Useful Life</li> <li>» Past experience with durability of products and materials</li> <li>» Analysis of historical weather patterns</li> <li>» Expected ADT</li> <li>» Expected levels of wear and tear</li> <li>» Seasonal restrictions (winter, school, etc.)</li> <li>» Holidays, special events, contractual restrictions</li> <li>» Peak traffic hours</li> <li>» PennDOT, or other agency, planned work</li> </ul>
<b>UPDATES TO RENEWAL WORK SCHEDULE</b>	<ul style="list-style-type: none"> <li>» Actual ADT</li> <li>» Actual weather patterns</li> <li>» Use of new products and materials</li> <li>» Use of innovative maintenance techniques</li> <li>» Inspection reports of actual conditions</li> <li>» Actual vs. expected performance</li> <li>» Actual levels of wear and tear</li> <li>» Seasonal restrictions (winter, school, etc.)</li> <li>» Holidays, special events, contractual restrictions</li> <li>» Peak traffic hours</li> <li>» PennDOT, or other agency, planned work</li> </ul>

**Staged Construction for Renewal Work**



All replacement bridges have been designed to have little or no need for major rehabilitation work during the Maintenance Period. PWKP does not expect to perform much staged construction type work for the Maintenance Period. When staged construction type work is needed work planning, and scheduling will follow the same principles, guidelines, and traffic control conditions established for similar work during the Construction Period.



**ATC #8 - POLYESTER POLYMER CONCRETE**

- With an expected useful life of 30 years or more, Polyester Polymer Concrete will eliminate intermediate overlays that require staged application.



# Preliminary Transportation Management Plan

## PRELIMINARY TRANSPORTATION MANAGEMENT PLAN

PWKP's Preliminary Transportation Management Plan (TMP) provides for the safe and efficient movement of people, goods, and services through Pennsylvania. PWKP's three-region management approach enables improved communication and coordination, and ensures Patron needs are addressed at every bridge site during design, construction, and maintenance. Through site investigations of every bridge in the program, PWKP has identified sound traffic control solutions that will minimize impacts to Patrons, residents, and businesses.

The Project will bring an unprecedented degree of bridge and road construction to Pennsylvania. PWKP's design optimizations, construction sequence and schedule plan, and maintenance approach are all focused on minimizing traffic disruption. To effectively manage the high volume of transportation-related matters during design and construction, PWKP will assign a Transportation Manager to each of the three construction regions defined in PWKP's Project Management Plan. Each individual reports directly to the respective Regional Construction Manager and is responsible for overall transportation management of all region Replacement Bridges, including:

- » Coordination with local governments, emergency service providers, law enforcement, schools, and affected residents and businesses
- » Enforcing compliance with the Project TMP and each site-specific traffic control plan (TCP)
- » Training workforce on Project-specific transportation management requirements
- » Providing cohesive link between the traffic design team and the construction team
- » Coordinating with PennDOT's Regional Traffic Management Centers
- » Coordinating with PennDOT's Central Permit Office on Special Hauling Permits for loads traveling through bridge reconstruction sites

During all Project periods, PWKP commits to minimizing impacts to Patrons and providing a safe work zone for both Patrons and workforce. This effort starts with developing a site-specific TCP for each Replacement Bridge location; then exerting a major coordination effort to effectively implement the 558 unique TCPs in just 36 months. PWKP's three region setup will streamline the logistics of executing many TCPs concurrently, as shown in **Figure 4.4-1**.



### PWKP'S PENNSYLVANIA TMP/TCP SUCCESS

PWKP has coordinated with PennDOT and other entities to execute TCPs on hundreds of bridges throughout Pennsylvania. PWKP's comprehensive TMP is based on its thorough understanding of the Project goals and requirements, and draws on team members' traffic management experience and success on complicated projects, including:

**+ Walsh Construction's experience on large, complex PennDOT and Pennsylvania Turnpike Commission projects in 7 PennDOT Districts**, including some of the most complicated traffic-related projects ever built in Pennsylvania.

**+ Granite's tremendous depth of experience in transportation management throughout the Mid-Atlantic and Northeast Corridor**, ranging from constrained urban environments in Philadelphia and New York City, to rural bridges and roadways in Maryland and Virginia.

**+ HDR's experience designing thousands of complicated projects for PennDOT** and other state DOTs including many with traffic control similar to the bridges on the Pennsylvania Rapid Bridge Replacement Project.

**+ Exclusive subcontractors' execution of hundreds of bridge replacements**, with similar traffic control requirements and scenarios, encompassing every PennDOT District.



Traffic control on I-95, CP-2 in Philadelphia

FIGURE 4.4-1 PWKP'S TMP OVERVIEW

**PWKP'S THREE-REGION BENEFITS**

PWKP's three-regional management plan addresses the complexity of coordinating traffic management for the Project's multi-location, multi-asset nature and provides a clear structure to simplify the logistics of developing, executing, and monitoring many concurrent TCPs. Additional benefits include:

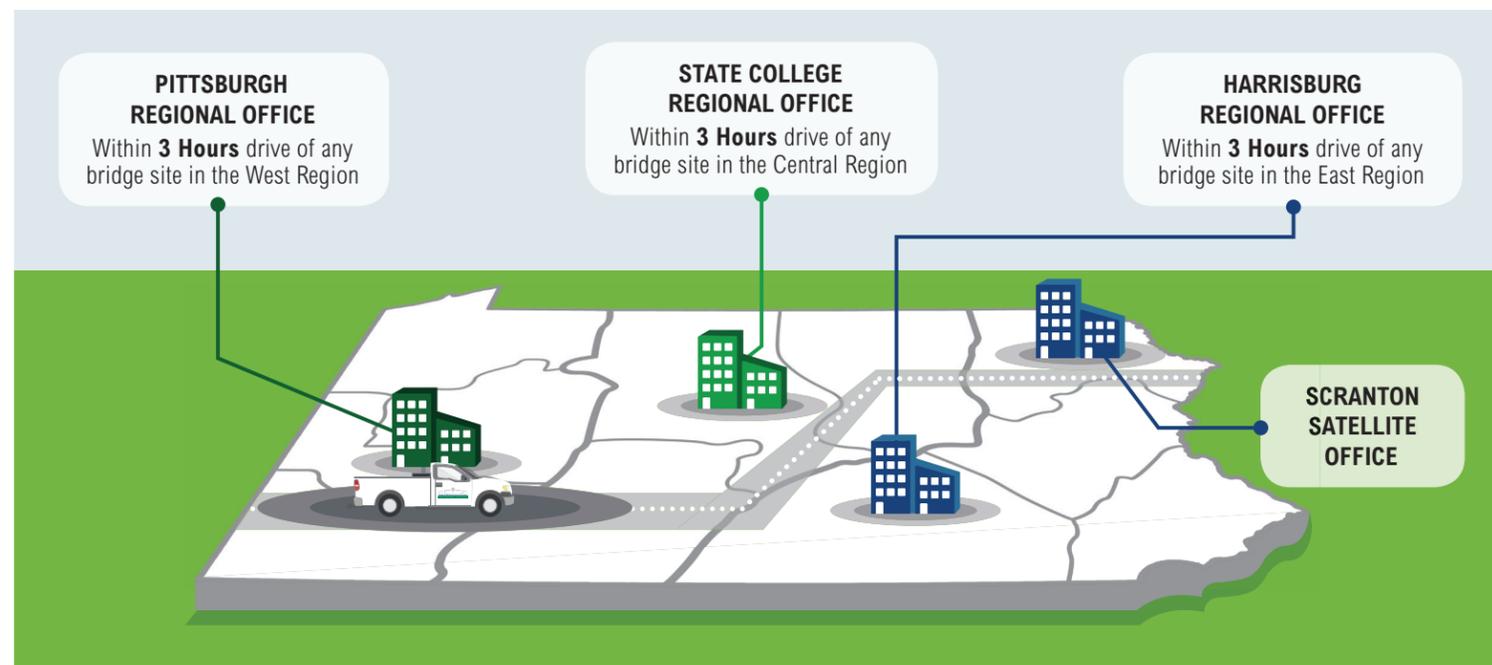
- + With each region overseeing approximately one-third of the Project's bridges, more attention can be devoted to each location.
- + Each regional office will be within three hour's drive of every bridge in its region, allowing swift response to situations requiring regional staff to be on location.
- + PWKP exclusive subcontractors are familiar with their dedicated regions, which simplifies the overall management of adherence to the TMP, TCPs, and PennDOT's standards.
- + A fourth office will be established in Scranton to provide additional resources when completing the East Region Early Completion Bridges.

**PUBLIC INFORMATION DISTRIBUTION**

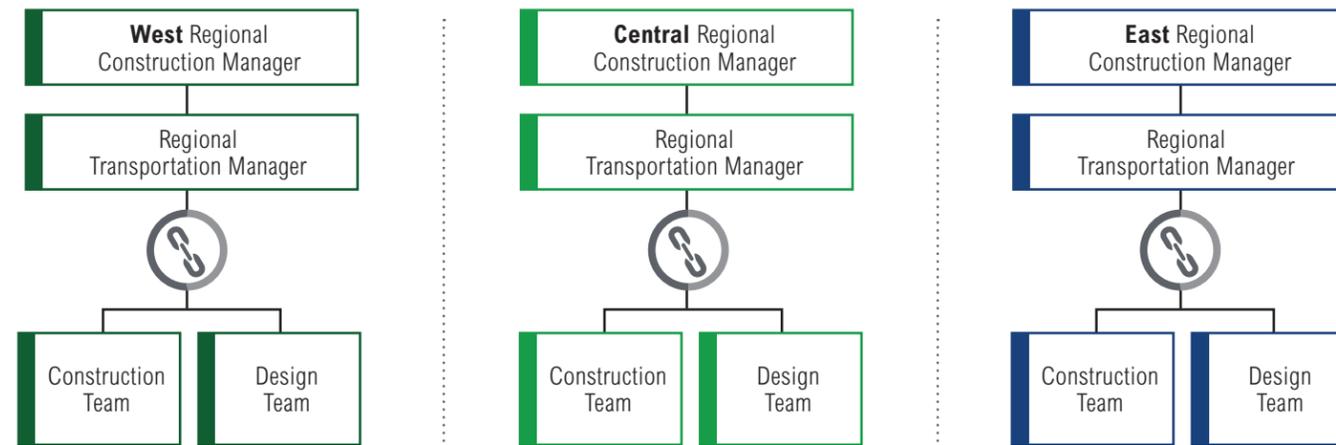
Key to an effective TMP is efficient distribution of information to the public. The Regional Transportation Managers will coordinate with the Public Information Coordinator to prepare Traffic Advisories to notify the public in advance of implementing any lane closures or traffic switches. Through the Traffic Management Technical Work Groups (TWG), members of the design, construction, and maintenance teams, along with the Public Information Coordinator, will develop and refine the Project TMP and TCP for each bridge site, disseminate Project information, and identify and incorporate needs of the following entities:

- PennDOT
- Local Governmental Entities
- Private Project Owners
- Transit Operators
- Utility Owners
- Emergency Service Providers
- School Districts
- Business Owners
- Hospitals
- Farmers
- Local Residents
- Other Related Patrons, Customer Groups or entities affected by the Replacement Bridge and surrounding affected areas

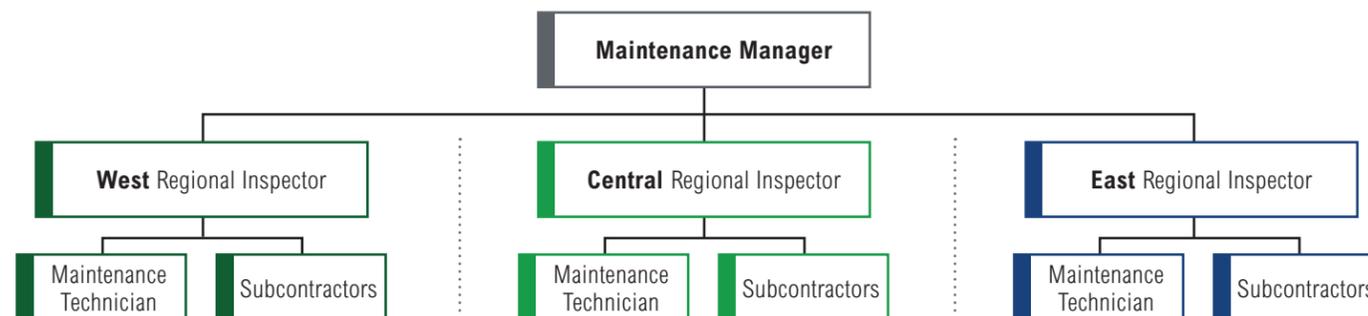
PWKP's Three Region Setup



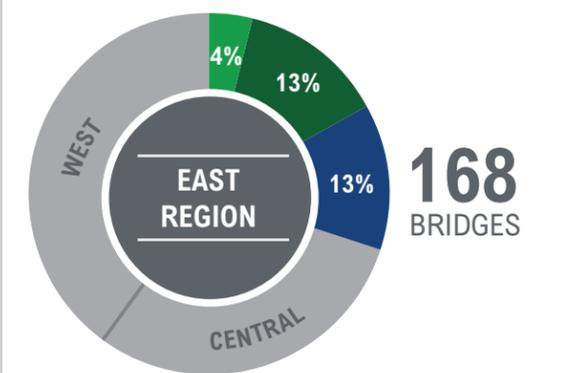
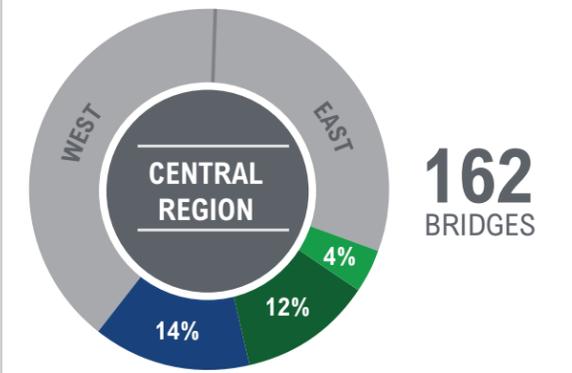
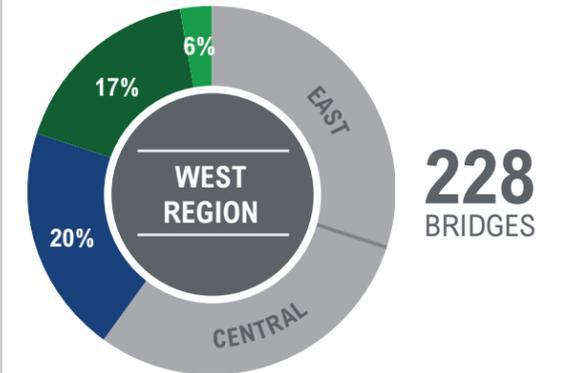
Internal Coordination during Design and Construction



Internal Coordination during Maintenance Period



Bridges and TCPs by Region



LEGEND

- 2015
- 2016
- 2017

## CONSTRUCTION SEQUENCING AND OVERALL APPROACH

PWKP developed the preliminary schedule through a detailed flowchart process to ensure each bridge is scheduled in a timeframe allowed by the specifications and in a manner that optimizes Project Goals. Factors PWKP used to determine the year a bridge is replaced were its ECB or REB designation, bridge weight limit postings, NBIS structural deficiency ratings, and approach roadway NBIS deficiency ratings.

Bridges with posted weight limits or severely deficient in structure or roadway were prioritized. Factors PWKP used to determine when in the construction season a bridge could be constructed were both spring and fall trout in-stream work restriction, school season detour restriction, tree cutting restrictions, and mandatory requirements listed in TP Attachment 10-1.



PWKP has optimized bridge designs that decrease the planned total number of detour days on the Project (**Figure 4.4–2**). This major reduction in public inconvenience is largely attributable to reducing construction time with quickly constructable box culverts and innovative elimination of new piers on numerous bridges.

PWKP will use staged construction, detours, and temporary roadways to sequence construction as follows:

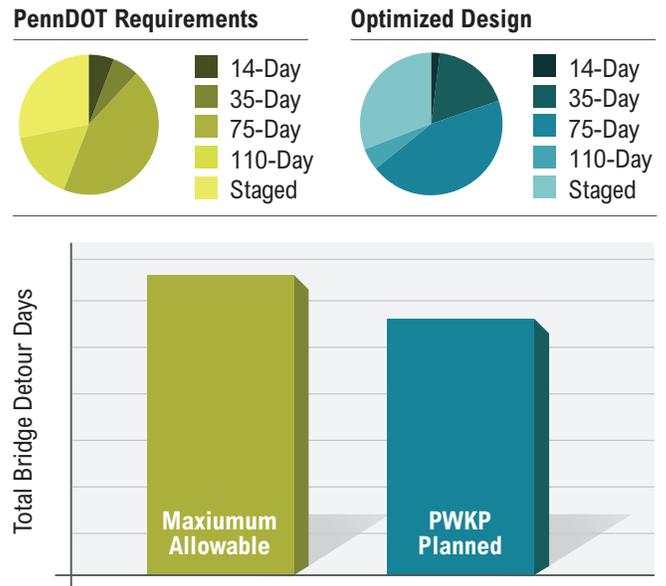
**Staged Construction:** Each of the bridges required to be built under staged construction in accordance with TP Attachment 10-1 will include a TCP coordinated with the new bridge design. Existing roadway and site conditions will be analyzed to determine the best sequence for staging.

**Detours:** When allowable, full roadway closures with detours will be used to allow bridge replacement in one stage. To simplify design and approval of the TCP, PWKP will use PennDOT-provided permitted detour routes when practical. State roads will be used almost exclusively, unless a significant benefit exists from using a local arterial. Local road usage in detour routes will conform to the TP. In some instances, PWKP may use staged construction instead of accelerated construction under limited allowable detour times. Each bridge replacement will be scheduled so the detour duration and timeframe adhere to the construction requirements set forth in TP and with the definition of Maximum Allowable Detour Period in the PPA.



**FIGURE 4.4–2 REDUCED DETOUR DAYS**

PWKP’s design reduces total planned detour days from the number allowed.



At numerous locations on the Project, several bridge reconstruction sites are near one another. In some situations, bridges are on the same highway and close enough to benefit from combining the traffic pattern on multiple bridges when no local access is required between the bridges, such as Cumberland County Bridges #13896 and #13897. One detour will be used while reconstructing the bridges concurrently—nearly halving motorists’ delay.

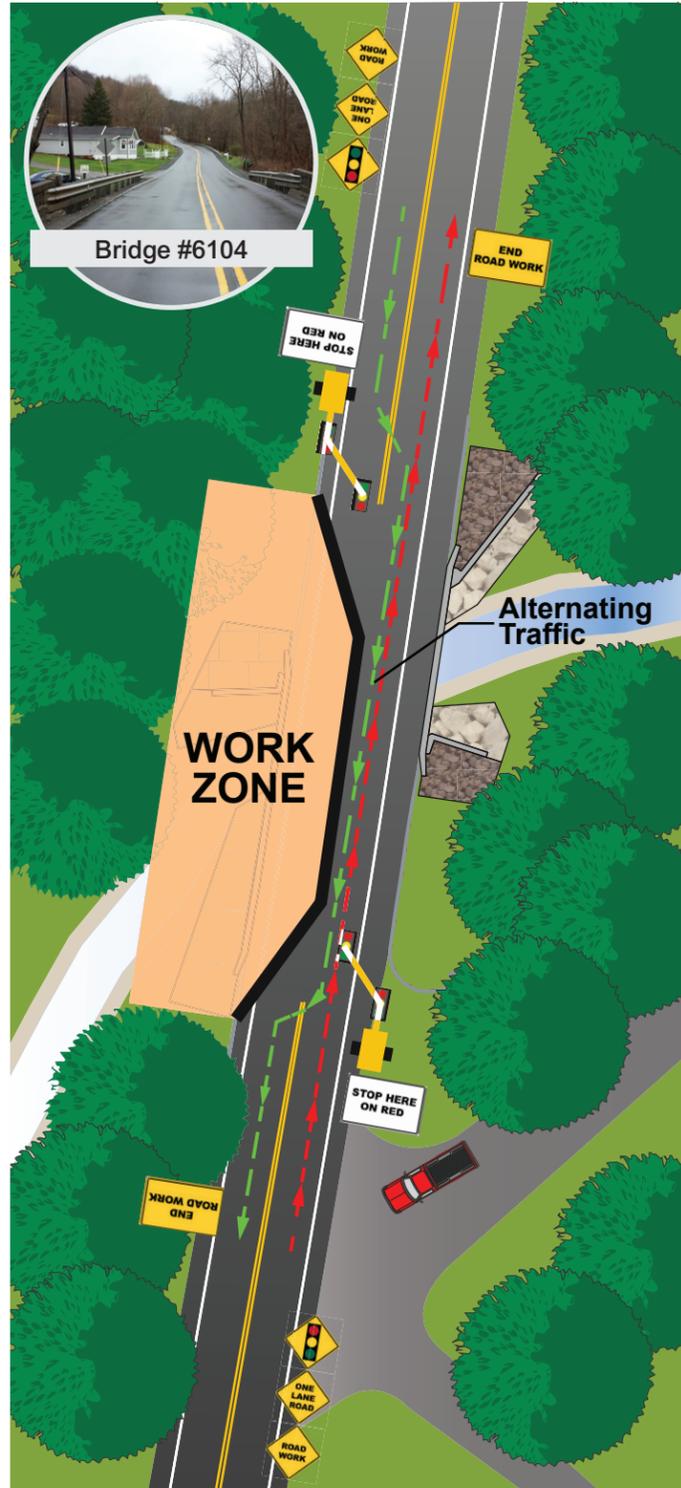
In other cases, the detour route for one Replacement Bridge crosses another Replacement Bridge. PWKP’s schedule will be structured to eliminate using detours for these bridges during the same timeframe. An example of this scenario is at Bridge #381 in Adams County where the provided detour route crosses Bridge #17407 in Franklin County.

**Temporary Roadways:** Twenty of the bridges will have a temporary road “runaround” with a temporary bridge or pipe crossing either as specified in the TP or because a site constraint precludes the possibility of staged construction. Each of these locations will require a Project-specific design for the temporary road. The temporary road will carry the minimum number of lanes specified in the TP and will be activated with the least possible interruptions to traffic.

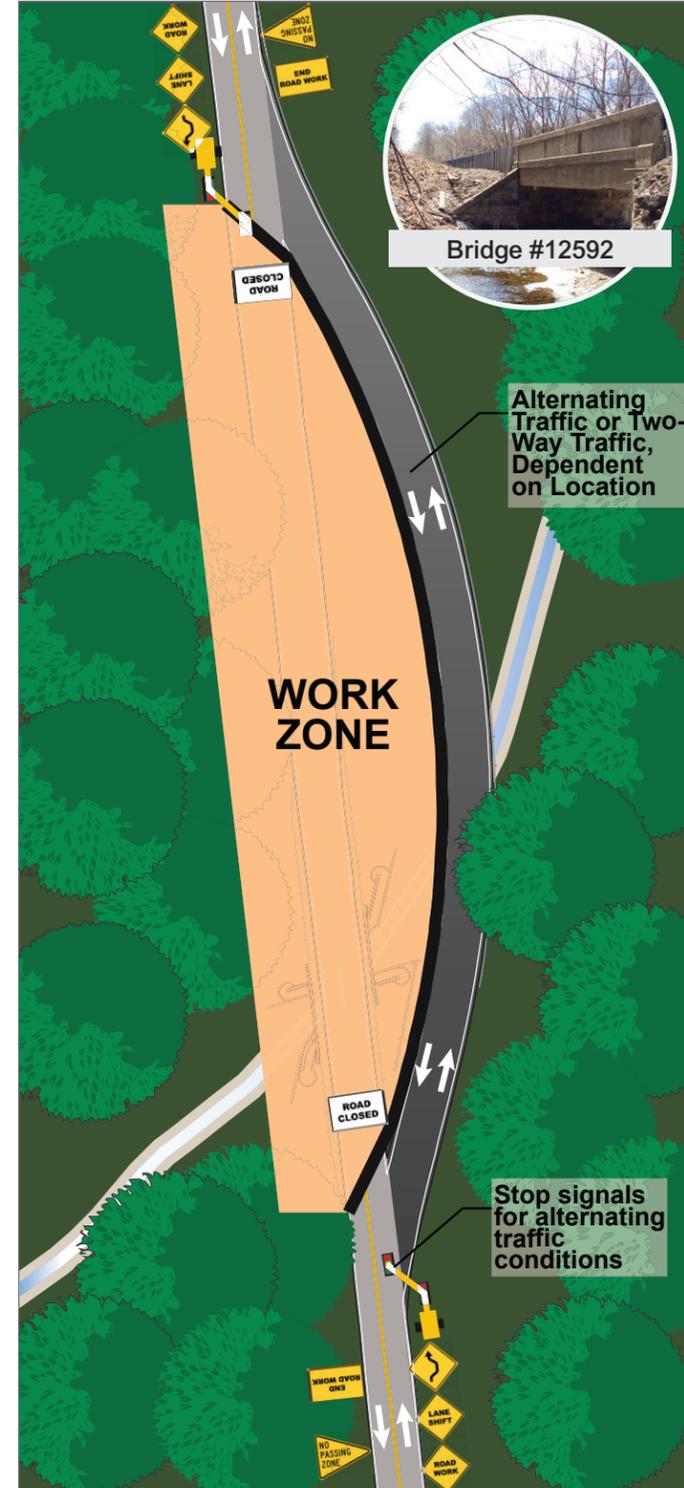
**Figure 4.4–3 through 4.4–6** illustrate PWKP’s sequencing and scheduling plan.

**FIGURE 4.4-3 TRAFFIC CONTROL SCENARIOS**

**TYPICAL STAGED CONSTRUCTION** traffic control will be designed in accordance with Publication 213.



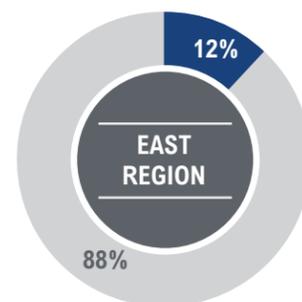
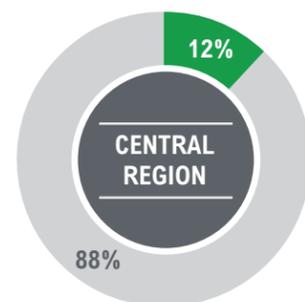
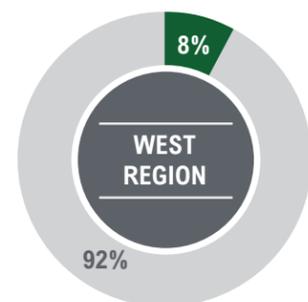
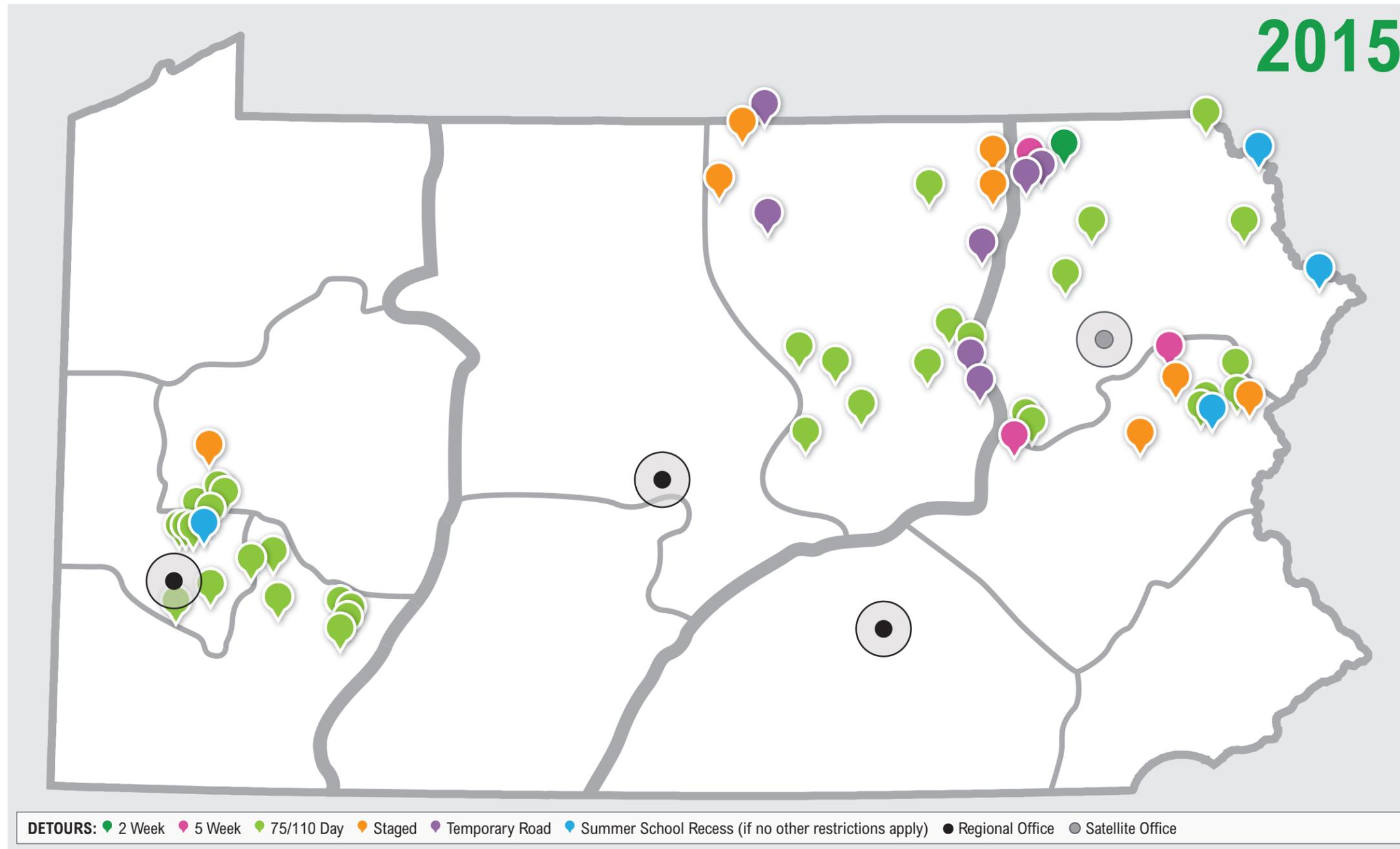
**TYPICAL TEMPORARY ROADWAY** traffic control will be designed in accordance with Publication 213.



**EXAMPLE DETOUR** route for Bridge 6164 is 7.8 miles. Traffic control for all detours will be designed in accordance with Publication 213, PATA 215 and 216.



**FIGURE 4.4-4 ANTICIPATED 2015 BRIDGES**



**LEGEND**

- West Region Bridges Under Construction
- Central Region Bridges Under Construction
- East Region Bridges Under Construction
- Bridges To Be Constructed

**PWKP PRIORITIZING EARLY COMPLETION BRIDGES**

PWKP has set the goal to complete 58 Early Completion Bridges in 2015. Each of the three regions has an equal share of construction in 2015. A satellite office in Scranton bolsters the resources needed to accomplish this goal.



**Bridge #36431 Westmoreland County:** PWKP plans to utilize a box culvert for rapid construction.

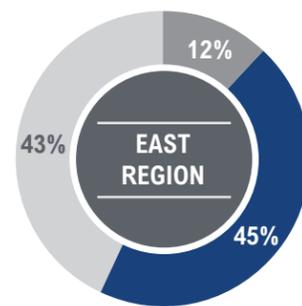
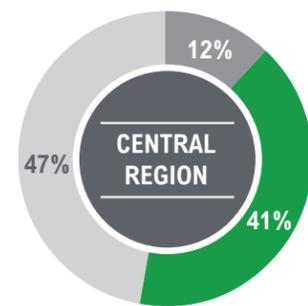
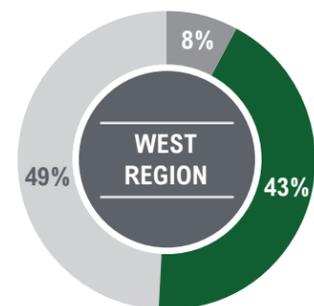
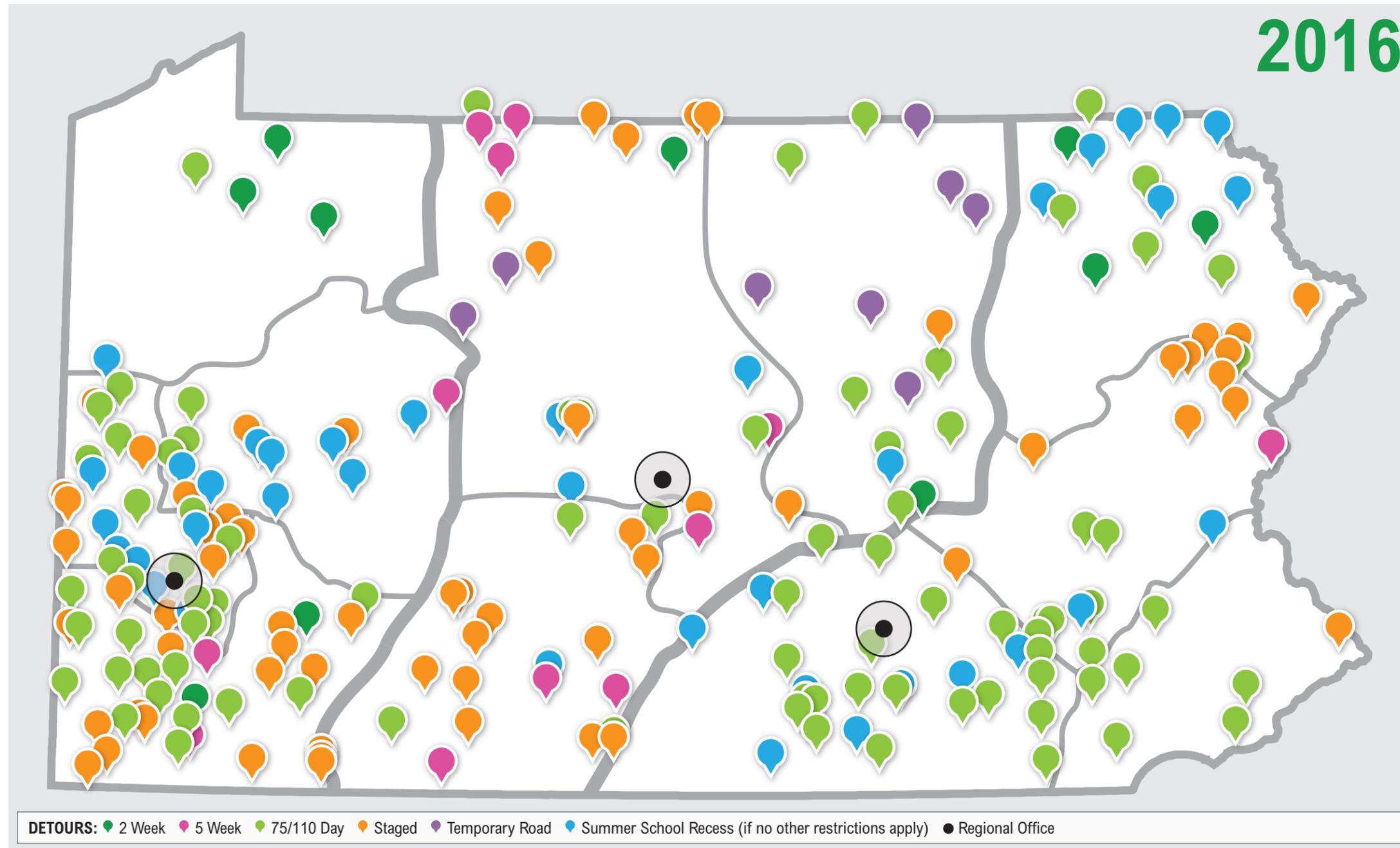


**Bridge #28389 Montour County:** The detour at this bridge will be completed by November 15, 2015.



**Bridge #8994 Carbon County:** A box culvert built under staged construction at this bridge will significantly reduce traffic impacts.

**FIGURE 4.4-5 ANTICIPATED 2016 BRIDGES**



**LEGEND**

- West Region Bridges Under Construction
- Central Region Bridges Under Construction
- East Region Bridges Under Construction
- Bridges To Be Constructed
- Completed Bridges

**PWKP PRIORITIZING BRIDGES TO MINIMIZE TRUCKING IMPACTS**

PWKP prioritized weight restricted bridges for the 2016 construction season. This approach eliminates weight restrictions up to two years early.



**Bridge #13128 Crawford County:** This bridge will be constructed during the school summer recess and opened to traffic before August 2016.

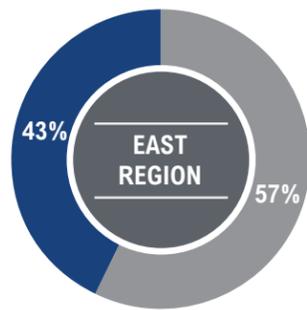
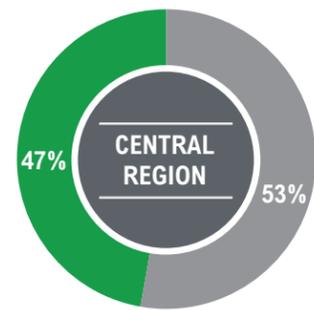
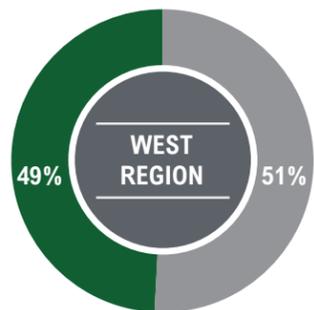
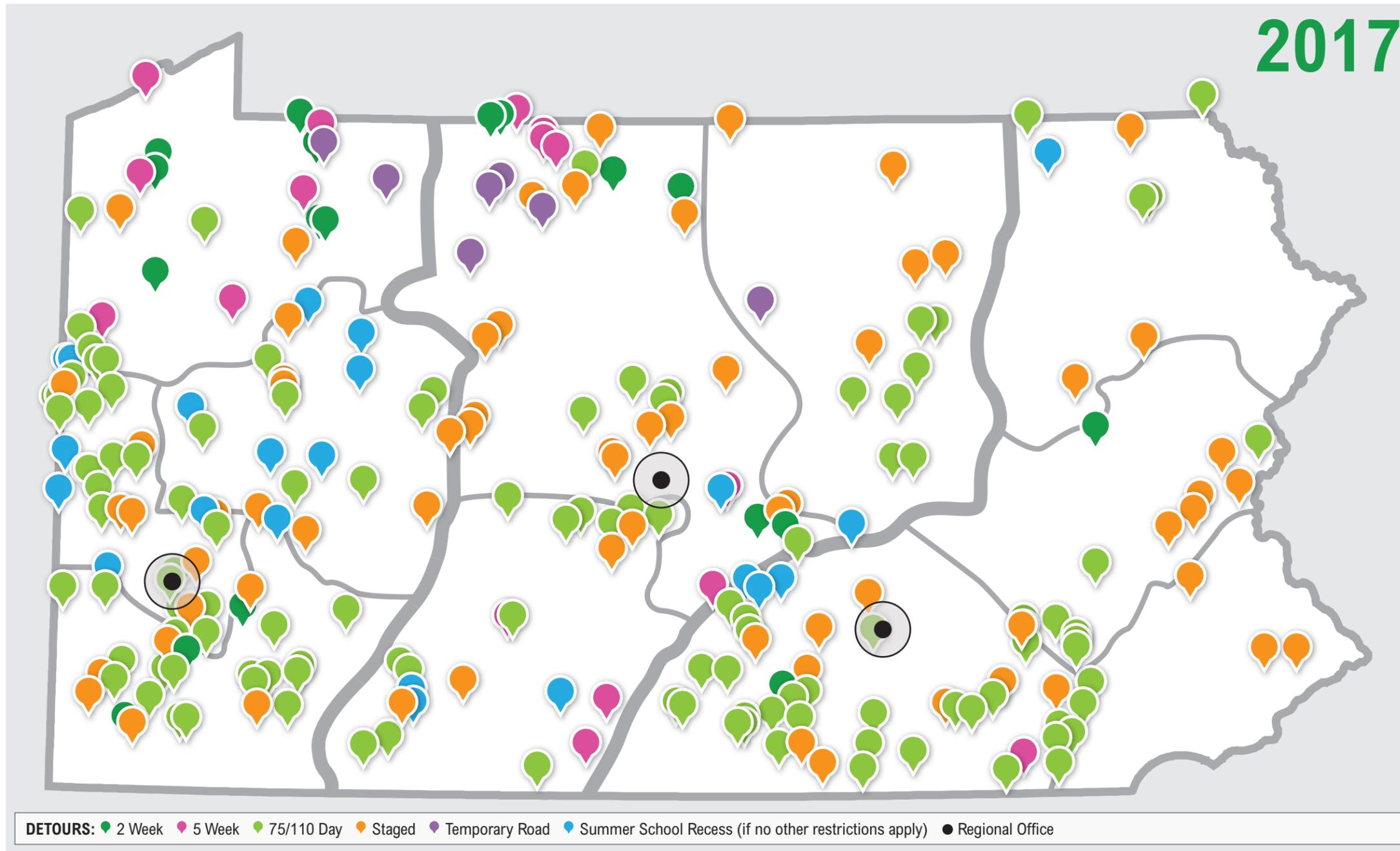


**Bridge #11245 Clearfield County:** The option of staged construction in lieu of a two-week detour will be utilized at this bridge.



**Bridge #32365 Susquehanna County:** This bridge is being constructed in 2016 to remove the bridge's weight restriction as early as possible.

**FIGURE 4.4-6 ANTICIPATED 2017 BRIDGES**



**LEGEND**

- West Region Bridges Under Construction
- Central Region Bridges Under Construction
- East Region Bridges Under Construction
- Bridges To Be Constructed
- Completed Bridges

**PWKP THE FINISH LINE**

All 558 bridges will be substantially complete by the end of 2017. Pennsylvania citizens are able to enjoy using safe, high-quality bridges thoroughly maintained by the PWKP team.



**Bridge #11042 Clarion County:** Larger bridges requiring new piers such as this bridge will be completed using a detour of 110 days or less.



**Bridge #8580 Cambria County:** Elimination of piers in the new bridge design will reduce the number of detour days from 110 to 75.



**Bridge #37921 York County:** The detour at this bridge will be completed in 75 days or less.

PWKP has addressed all requirements including provisions set forth in the PPA, Technical Provisions (TP), and TP Attachment 10-1, and has an understanding of all mandatory requirements. PWKP visited every bridge site to identify and develop an individualized plan for traffic maintenance and protection during design, construction, and maintenance for each site, as described in more detail below.

**Construction Hauling:** With the high volume of construction for the Project, there will be an increase in transport of heavy equipment, bridge girders, and pre-cast bridge pieces, which significantly increases the number of Special Hauling Permit Loads and some increase in Super Loads traveling through Pennsylvania. PWKP will draw on its team members' experience planning and executing the movement of these types of loads in Pennsylvania and throughout the country. Each Transportation Manager will contact PennDOT's Central Permit Office with lane width change notifications at bridge replacement sites.

**Overpass Bridges:** Nine of the Project's bridges are over active public roadways. Of those, seven are major limited access freeways and two are major two-lane highways. Each will require a thorough TCP for the travel way underneath the bridge, in conjunction with the route being reconstructed, that minimizes Patron inconvenience. The plan will address any traffic restrictions on the roadway below during demolition, beam erection, and superstructure construction activities along with any other interruptions that are anticipated throughout the bridge replacement.

**Coordination of Signal Timing and Intersections:** Approximately 20 Replacement Bridges are in close proximity to signalized intersections. In each of these

**OVERPASS BRIDGES** On Bridge #20820 in Lackawanna County, PWKP will accommodate I-81 traffic during demolition, construction and maintenance.



## CONSTRUCTION HAULING EXPERIENCE

PWKP has experience planning and executing the movement of large loads, including delivering 175 concrete girders up to 168 feet long to the Lehigh/Pohopoco Bridges in Carbon County, Pennsylvania.



situations, PWKP will specifically design the TCP to integrate the Project's traffic control with the signalized intersection.

In circumstances that require temporary traffic signals to alternate traffic over a staged bridge, the temporary signals will be designed in the TCP to be integrated into the permanent signalization sequence. In locations with existing pedestrian signalization, the TCP will integrate pedestrian signage and signalization with the existing signals. PWKP will coordinate with relevant municipalities on all traffic signal modifications and maintenance.

In instances where existing traffic signals are modified during construction, PWKP will monitor traffic flow and queuing and make adjustments to the signal timing to optimize traffic flow. The AM and PM peak hours will be observed approximately two days after modified signal deployments. Based on these observations, minor adjustments to the signal timing or phasing will be implemented to improve conditions.

**SIGNAL TIMING & INTERSECTIONS** On Bridge #505 in Allegheny County, PWKP will maintain traffic signal integration for motorist and pedestrian safety.



**Maintenance and Usage of ITS:** PWKP has identified existing Intelligent Transportation System (ITS) infrastructure at a few locations. When ITS components already exist on a bridge to be reconstructed, PWKP will design the bridge structure to incorporate the existing ITS components. The TCP will address protection of existing ITS within the Project limits.

As specified in the TP, PWKP will coordinate with PennDOT to use any applicable dynamic message signs on the regional ITS system when available. The signs may be used for advanced notifications of scheduled roadway traffic pattern changes or of upcoming construction activities that may impact traffic.

**Railroads:** At locations with railroads present, PWKP will develop a site-specific plan for railroad coordination in accordance with TP Section 13 to enable construction activities and normal railroad traffic to continue efficiently. There are three scenarios that require different coordination efforts:

- » **Bridge over Active Railroad:** Only four of the bridges to be replaced are over active railroads. In these cases, significant coordination efforts will be required since a great deal of the work will take place within the railroad right-of-way (ROW). PWKP's plan will follow all contract specifications to minimize railroad service interruptions by engaging the railroad in pre-planning activities.
- » **Railroad Intersecting the Highway within the Construction Site:** PWKP will provide traffic control to keep construction equipment and materials clear of the intersecting railroad. PWKP's

**RAILROAD COORDINATION** On Bridge #14481 in Dauphin County, PWKP will coordinate with Norfolk Southern Railroad to minimize railroad interruptions.



**ITS INFRASTRUCTURE** PennDOT's dynamic message signs will aid in keeping motorists informed of Project traffic conditions.



plan will include provisions to protect the railroad, the construction site, and the traveling public.

- » **Railroad Parallel to the Bridge Reconstruction:** PWKP will assess the proximity of the railroad and incorporate provisions in the construction plan. In some instances, the railroad proximity will warrant detailed plans that may include ROW takes, utility relocations, or support of excavation.

**Boating Traffic and Aids to Navigation:** PWKP will follow all requirements of DM-2 along with Strike-Off Letter 482-13-18 to determine if a waterway requires an Aids to Navigation (ATON) Plan. At locations used by motorized boats, a more extensive arrangement including floating buoys may need to be part of the ATON Plan. If the determination is made that a site requires ATON, the plan will be submitted to the Pennsylvania Fish and Boat Commission (PFBC).

**BOATING TRAFFIC & AIDS TO NAVIGATION** On Bridge #26907 in Monroe County, PWKP will develop ATON plan to ensure the safety of boating traffic.



## Maintenance Period Requirements

PWKP will provide traffic management and work scheduling during the Maintenance Period by adhering to the Project TMP, MUTCD guidelines, and PennDOT standards. The Project TMP developed for construction and maintenance during construction, will be adapted to the Maintenance Period, with the same goal of providing a safe and available facility, minimum disruption, and efficient travel.

The nature of work during the Maintenance Period is inherently less disruptive to traffic flow than that taking place during the Construction Period, and is mainly divided into three categories: inspections, routine maintenance, and renewal work.

- » **Inspections:** Annual inspections and most routine maintenance work will be scheduled to be performed simultaneously. This scheduling maximizes efficiencies by proactively correcting defects when identified, and reduces the required number of traffic controls per location. Any routine maintenance work that cannot be accomplished, or any defects that cannot be corrected at the time, will be scheduled for completion within the cure periods established in Table 17-1 of the TP.

Most inspection work will be done without interruptions to traffic flow. In some cases, deck, joint, and rail inspections may need lane closures. These inspections will be done concurrently with the annual bridge deck washing, when possible.

- » **Routine Maintenance:** Traffic control for routine maintenance work will not require more than standard single lane closures for the most complex tasks, such as pothole repairs, rail repairs, and bridge deck washing.
- » **Renewal Work:** Traffic control for renewal work will follow the same guidelines and principles applicable for the Construction Period, as it relates to lane closures and long-term impacts on local Patrons. TCPs will be prepared specifically for the Renewal Work and submitted to PennDOT for approval. Replacement of a bridge deck overlay would be the most traffic-impacting activity for the Maintenance Period.

All restrictions on lane closures set forth in the TP will be adhered to when planning and scheduling maintenance work. Lane closures will be scheduled outside of holidays and special event dates. Occasionally, inspection, routine maintenance, and renewal work on bridges over other facilities will require traffic control installation on those facilities. Traffic control will be coordinated with PennDOT and local governments, if applicable, for implementation during periods of low impact to traffic, and to avoid conflicts with other PennDOT or local government planned traffic control. When possible, PWKP will schedule traffic control coinciding with similar PennDOT or local government planned traffic control in order for both activities to take place simultaneously and reduce the overall inconvenience to Patrons.

### TYPICAL TRAFFIC CONTROL DURING THE MAINTENANCE PERIOD

INSPECTIONS	ROUTINE MAINTENANCE	RENEWAL WORK & SEVERE DAMAGE REPAIRS
Standard MUTCD and PennDOT traffic control	Standard MUTCD and PennDOT traffic control	Standard MUTCD and PennDOT traffic control, or special traffic control design
Options	Options	Options
<ul style="list-style-type: none"> <li>✔ Warning signs and shoulder protection only</li> <li>✔ Single lane closure, with flagging operations</li> <li>✔ Single lane closure</li> </ul>	<ul style="list-style-type: none"> <li>✔ Warning signs and shoulder protection only</li> <li>✔ Single lane closure, with flagging operations</li> <li>✔ Single lane closure</li> <li>✔ Mobile lane closure</li> </ul>	<ul style="list-style-type: none"> <li>✔ Single lane closure, with flagging operations</li> <li>✔ Single lane closure</li> <li>✔ Multi-lane, or bridge, closure</li> <li>✔ Detours</li> </ul>

## BUSINESS AND RESIDENTIAL ACCESS

PWKP is committed to addressing business and residential property access for motorists, pedestrians, and bicyclists. PWKP will also coordinate with emergency service providers to ensure they are able to continue to provide reliable response times.

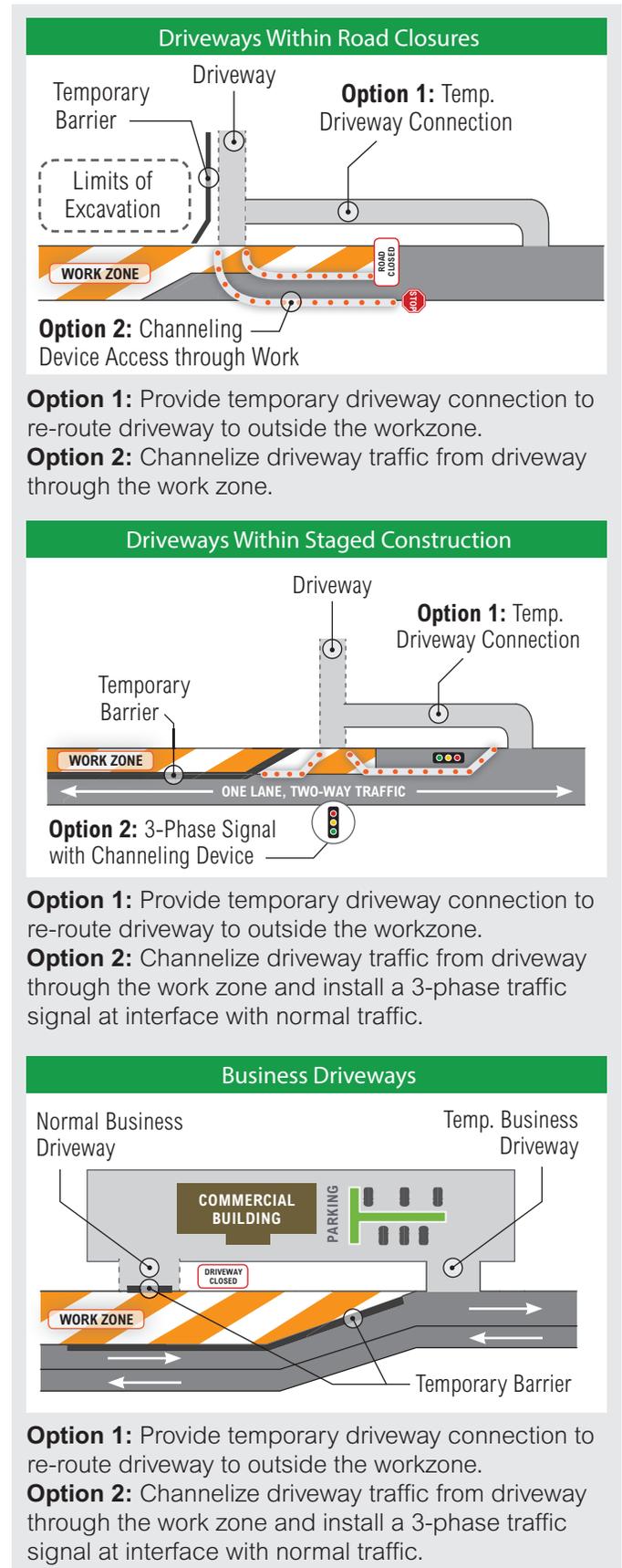
Most replacement bridges have one or more driveways of that will be within or just outside the construction limits. For those driveways that are just outside of Project limits, PWKP will inform the driveway owner of pending traffic control pattern and caution them on changes that may occur when entering or exiting the driveway. For those driveways more directly affected, PWKP will ensure property access through the methods shown in **Figure 4.4–7**. PWKP has classified three types of driveways to address the differing needs of each driveway owner as well as the challenges to maintain and protect traffic during construction:

**Residential Driveways:** Many bridge sites will affect at least one residential driveway. PWKP will study each site to determine location of driveways and the potential impact that the traffic pattern and construction activities will have on access. PWKP will develop solutions to accommodate access; in some cases by incorporating the driveway into the traffic pattern using combinations of channelizing devices, barrier, signage, and temporary signals.

**Business Driveways:** PWKP will maintain a minimum of one all-weather driveway per business at all times. Combinations of channelizing devices, barrier, signage, temporary striping, and temporary signals will be used to direct traffic to and from business driveways. The business will be kept informed of changing traffic patterns. In cases that a closure cannot be avoided, PWKP will contact PennDOT to request approval of the closure and a determination on timeframe restrictions to be incorporated into the TCP.

**Farm Access Driveways:** Hundreds of the bridge reconstruction sites are located in agricultural areas. A significant number of those sites have farm field access points near or within the construction limits. If practical, PWKP will accommodate these entrance points to allow farmers continuous access. In cases where the entrance point needs to be temporarily closed during bridge reconstruction, alternate access points will be coordinated with the property owner to allow farm

**FIGURE 4.4–7 METHODS TO MAINTAIN DRIVEWAY ACCESS TO RESIDENCES AND BUSINESSES**



operations to remain uninterrupted. Considerations for Older Order Communities specified in the Mandatory Construction Requirements in TP Attachment 10-1 will be included in the site's TCP.

**Emergency Services Vehicle Access:** Through pre-construction coordination with local emergency services, PWKP will gain an understanding of the needs of individual emergency service providers. Some techniques that may be utilized to aid response times are traffic signal preemption capability by fire departments and ambulance services; flagman allowing emergency response vehicles through lane closures; and site personnel accommodating entry and passage of emergency response vehicles through work areas.

**Pedestrians and Bicycles:** PWKP will determine the extent of pedestrian and bicycle accommodation (including detour signage, sidewalk and crosswalk delineation, handrails, and bike route signs) to include in the TCP at applicable locations. PWKP will follow TP requirements addressing new sidewalks proposed by municipalities in the public involvement process and maintaining ADA standards during construction. Bridges with existing or new pedestrian walkways will maintain access across the bridge at all possible times.

PWKP will determine which unique situations require special attention in the TCP, such as the Appalachian Trail crossing at Bridge #13616 in Cumberland County or the various bridges located on Pennsylvania's bike

**MAINTAIN DRIVEWAY ACCESS:** PWKP will implement traffic control to maintain property access in cases like for Bridge #17408 in Franklin County where the driveway is adjacent to the bridge to be replaced.



routes. The TCP will minimize disruption to users of these unique pedestrian or bike routes, whenever possible. PWKP may also contact representatives of pedestrian or biking groups for input on developing the applicable portion of the TCP.

## **SCHEDULE & SEQUENCE CONSIDERATIONS FOR THE ENVIRONMENT, COMMUNITIES, AND THE TRAVELING PUBLIC**

The Traffic Management TWG has met numerous times already to develop thorough scheduling and sequencing strategies to minimize the impacts of traffic changes on the environment, communities, and the traveling public:

**Environment:** Plans for temporary traffic structures like roadways, bridges, and stream crossings will include erosion and sediment controls. Construction activities associated with staged construction, such as demolition, saw cutting, and concrete removal, have already been planned with measures included to control concrete and slurry from entering waterways. The detailed preliminary baseline schedule ensures that in-water work is scheduled around the spring trout in-water restriction and the fall wild trout in-water restriction, while identifying an appropriate timeframe to construct the bridge within the allowable traffic control restrictions and construction season.

**Communities:** As frequently as possible, PWKP will balance use of state highways with minimizing detour lengths to globally reduce the amount of traffic traveling on local streets without creating excessive detour lengths. Most work is planned to be performed during normal working hours, so significant night and weekend noise impacts are not anticipated. Work zone areas and signage will always be setup in a way that is unobtrusive to residents and businesses.

**Traveling Public:** PWKP's construction plan and schedule has been developed to reduce construction time. The reduction decreases time that motorists spend delayed on detour routes or at stop signals. PWKP's strategy will lead to a reduction in detour days from that allowed by contract. On a site-by-site basis, delays to the traveling public will decrease by developing a TCP with short detour routes and comprehensive site traffic control.

## LOCATIONS FOR LAYDOWN, RECYCLING, STAGING, DISPOSAL, AND MAINTENANCE

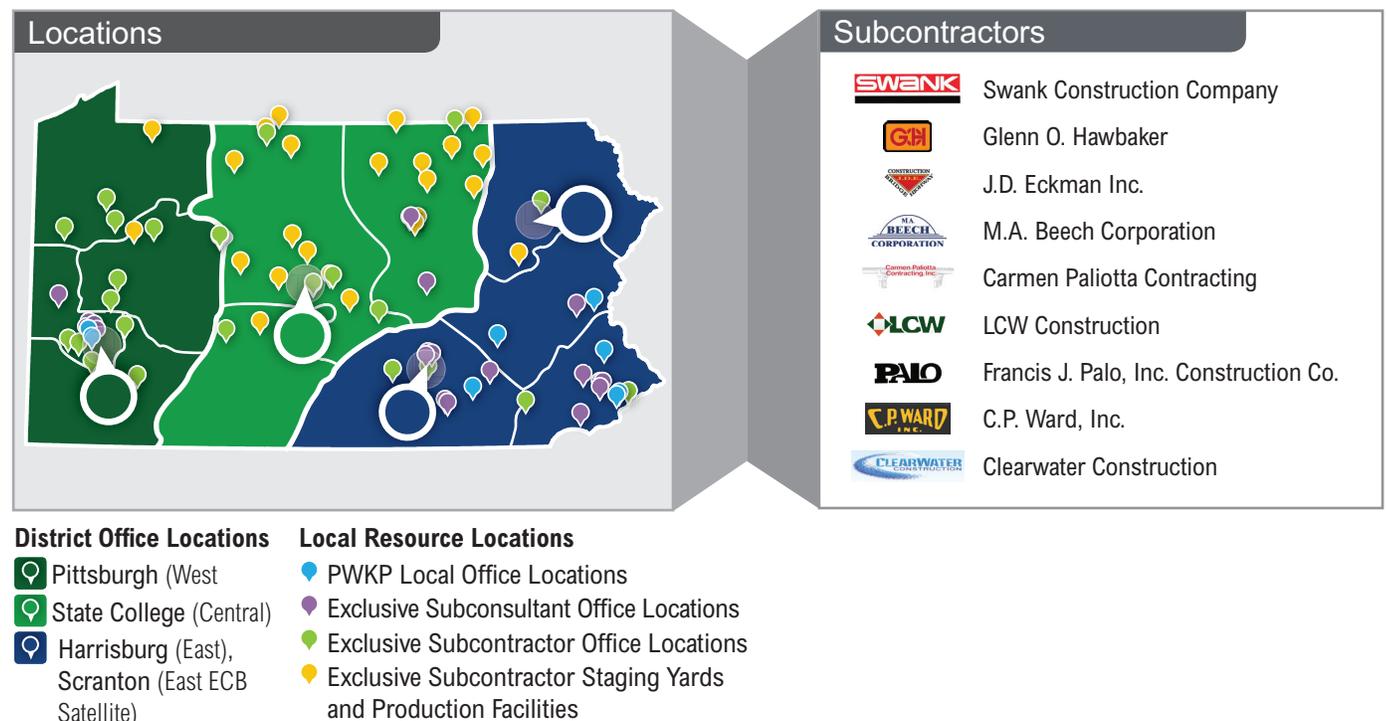
 The PWKP Team includes many local, exclusive subcontractors and suppliers who will use their regional knowledge and past experience to source locations key to the Project’s logistical operation (**Figure 4.4–8**). PWKP’s strategy will best utilize subcontracting resources by packaging multiple sites geographically near bridges into one contract, allowing subcontractors to combine facilities for multiple bridges. PWKP has and will continue to plan the construction sequence in a way that most efficiently uses the many facilities required, which include:

- » **Storage Laydown Yards and Warehouses:** Ahead of the start of construction, PWKP and its exclusive subcontractors will source and secure sufficient capacity to store required project materials and equipment, as necessary. PWKP will source facilities located in close proximity to major highways, which will cause minimal disruption of traffic with little or no community impact.
- » **Recycling Yards:** PWKP has identified permitted facilities approved for such recycling of scrap steel, concrete rubble, and other recyclable material.

- » **Staging Areas:** PWKP will set up staging areas at the bridge sites in a way to minimize environmental disturbance by securing nearby open lots when possible, and avoiding clearing and grubbing for staging areas when practical. Staging areas will be set up in locations where delivery trucks and jobsite vehicles and equipment can safely enter and exit with minimal disturbance to traffic flow.
- » **Disposal Facilities/Waste Areas:** Waste areas will be secured through agreements with property owners as done on a typical project. The proper environmental permits will be in place for all waste areas. PWKP’s goal is to secure waste areas within a few miles of the bridge replacement site to minimize time, cost, and environmental impacts to remove waste material from the bridge site.
- » **Construction Maintenance Facilities:** PWKP may establish certain facilities to store and maintain equipment, tools, materials, and construction maintenance supplies. These types of facilities may also be provided by our exclusive subcontractors, who have many facilities across Pennsylvania capable of storage and maintenance.

**FIGURE 4.4–8 LOCAL RESOURCES**

PWKP has statewide resources available for this Project. With local connections in every PennDOT district, PWKP will source locations for each bridge site for effective and efficient operations.



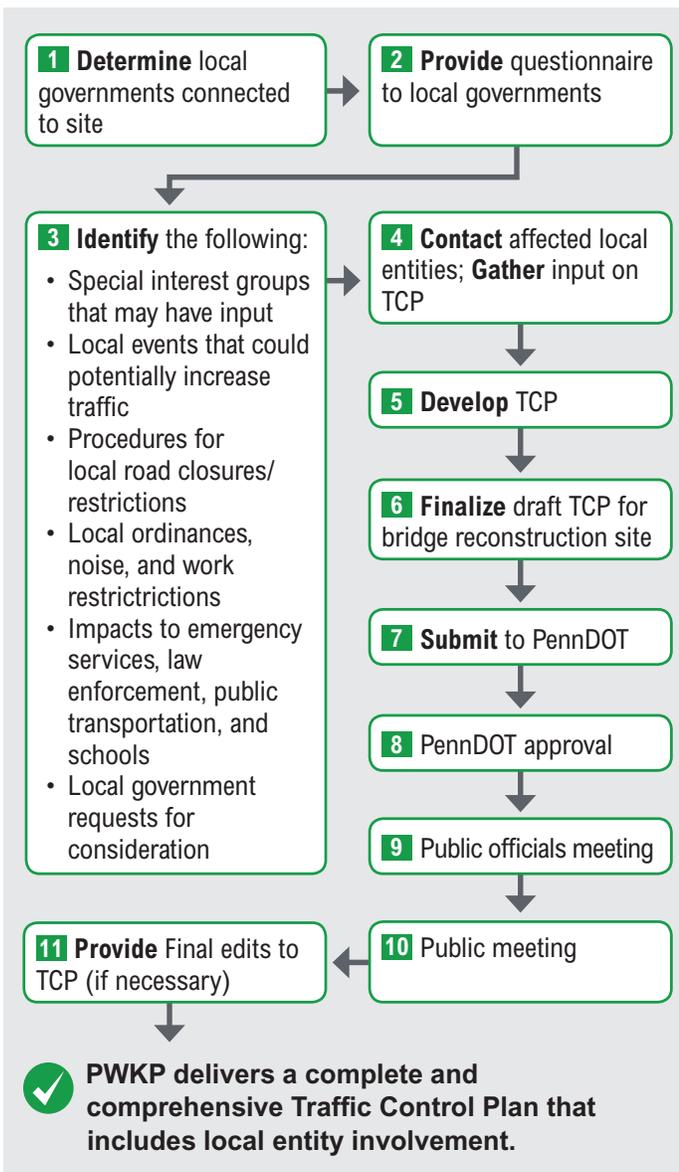
## TCP DEVELOPMENT & COORDINATION

PWKP’s site-specific TCP developed for each Replacement Bridge will conform to the allowable traffic control categories indicated in TP Attachment 10-1 and will be developed in accordance with PennDOT’s Design Standards and Design Manuals.

PWKP will develop each TCP by following the procedure shown in **Figure 4.4–9**. This process ensures PennDOT, local Government Entity, environmental, community, and resident needs are identified and addressed.

**FIGURE 4.4–9 TCP DEVELOPMENT**

PWKP will coordinate with PennDOT and local governments to ensure a thorough traffic control plan for each Replacement Bridge is developed for successful execution that minimizes traffic disruption.



PWKP will consider any potential limitations discovered through pre-design discussions with PennDOT and local entities. PWKP will work in close coordination with PennDOT and local Governmental Entities to develop TCPs, as described below:

**Coordination with PennDOT:** Prior to developing TCPs, PWKP will schedule preliminary meetings with PennDOT to discuss the preliminary baseline schedule to expose any conflicts the Replacement Bridge has with PennDOT’s regular construction and maintenance program.

Through discussions with PennDOT, PWKP will determine whether to modify the schedule to eliminate project overlap or coordinate with the overlapping project so that construction of the Replacement Bridge can commence concurrently. The TCP will be developed to incorporate any required coordination discussed with PennDOT.

**Coordination with Local Governments:** During the design phase, PWKP will determine local governments connected to the location of each Replacement Bridge. These local governments will be contacted and asked to complete a standard questionnaire to identify local groups and specific situations with the potential to influence the development of the TCP.

PWKP will schedule and conduct Public Official Meetings and Public Meetings in accordance with the TP. PWKP will address public concerns related to transportation management in the TCP through information previously obtained in the questionnaires to the extent that the Public Officials Meetings and Public Meetings should not garner any changes to the TCP. In the event that a change to the TCP is requested at one of the meetings, PWKP will determine the impact to its construction plan and accommodate the change to the TCP if it is practical.

**Ongoing Monitoring of TCP:** PWKP will continuously monitor the effectiveness of the TCP and incorporate changes through PennDOT approval as needed. TCPs developed for construction will carry into the maintenance period and will be used when detours or phasing are necessary during the course of routine and rehabilitation maintenance work.

PWKP’s Transportation Managers will monitor the TCP for compliance during construction and make any necessary adjustments to construction activities.

Each Transportation Manager will also coordinate any required design changes in the TCP with the Design Engineer, which will then be submitted to PennDOT for approval.

During the maintenance phase, TCPs will be utilized, followed, and amended in the same fashion as during construction. In 25 years, many circumstances are assured to change, and PWKP's maintenance team will be prepared to adjust the TCPs to accommodate any changing conditions or requirements.

## SPECIAL EVENTS

PWKP will identify special and community events that may need to be addressed in the TCP and Project schedule. These events will be identified through local government questionnaires obtained in the design phase.

Scheduling for all lane or ramp closures is coordinated with local events and holidays during construction and during routine and renewal maintenance work. Additional increased public outreach and information distribution will occur prior to these and other events to inform the traveling public of current staging and traffic conditions in the area.

The public information office will reach out to coordinators of special events that may be impacted by temporary traffic control and will act as the link between the special event and the construction or maintenance team.

### SPECIAL EVENT COORDINATION:

During Cleveland Innerbelt CCG1 construction, Walsh Construction provided safe traffic control and accommodated the requests and needs for special events. The project was located in a high traffic area and adjacent to the Cleveland Indians baseball stadium.



"I keep telling people how responsive and cooperative you all are...and you keep proving me right!" Jim Folk, Cleveland Indians

## EMERGENCY EVENTS

Workforce and public safety is PWKP's number one priority. PWKP will staff the Project with individuals thoroughly trained and knowledgeable on highway safety. PWKP's staff will prepare for emergency situations and incidents by employing the following measures:

- » PWKP will develop an Emergency Response Plan as part of the Project Safety Plan, that details procedures for emergency situations and coordination with emergency responders. PWKP will disseminate the plan to its subcontractors to be implemented at the bridge replacement sites.
- » PWKP and its subcontractors will be prepared to assist emergency responders and law enforcement including assistance directing traffic and clearing access for emergency vehicles.
- » PWKP's Safety Plan will detail how incidents on the Project are to be handled. Procedures for notifying PennDOT and any appropriate stakeholders of an incident will be included.
- » Hazardous material spills will be addressed expeditiously in accordance with Environmental Protection Agency (EPA) and Department of Environmental Protection (DEP) regulations. Staff will be trained on procedures for hazardous material spills. Hazardous material spills will be reported to PennDOT and relevant stakeholders.

Through advanced planning, the PWKP team will execute proven preventative measures to minimize the occurrence of emergencies, incidents, and release of Hazardous Materials and corresponding impacts to traffic flow.

## IDENTIFYING AND INCORPORATING THE NEEDS OF LOCAL ENTITIES

PWKP will design and construct the Project, including implementation of lane closures and detours, with the objective of minimizing traffic disruption and following the requirements in Table 10-1 of the TP. PWKP will contact the entities shown in **Table 4.4-1** to identify specific needs and incorporate those needs into the TCP whenever reasonable or practical.

**TABLE 4.4-1 TCP CONSIDERATIONS FOR LOCAL ENTITIES**

<b>AFFECTED USER</b>	<b>USER NEEDS</b>	<b>PWKP SCHEDULING/SEQUENCING METHODS TO ADDRESS IN TCP</b>
<b>Transit Operators</b>	Continuous, uninterrupted service to customers	Maintain public bus stops falling within project limits in its current location or temporarily relocated upon coordination with the relevant transit authority. No bridge sites have been determined to impact Pennsylvania Turnpike traffic, or operations of passenger rail lines, airports, or ferries.
<b>Utility Owners</b>	Access for maintenance and during emergencies	Grant safe access expeditiously for utility companies to make emergency repairs to fix outages or damaged utilities. Assign PWKP's Utility Coordinator to be the point of contact for utility companies to schedule routine work or maintenance while working at a Replacement Bridge site.
<b>Governmental Entities</b>	Consideration for special events; coordination with other projects	Send preconstruction questionnaires to local governmental entities to identify special needs. Address local government needs in the TCP and Project schedule to coordinate with special events and local projects.
<b>Emergency Services Providers</b>	Public safety and quick response times	Provide access that allows emergency services to maintain fast response times. Maintain blue "H" motorist service signs through the site at a staged bridge location or with temporary signs through detour routes on applicable detours wherever bridge reconstruction is on a hospital route.
<b>School Districts</b>	Access to school, bus stops, and bus routes	Implement detours only after school year has been completed at all schools that use bridge on school bus routes. Incorporate procedures for any bus stop at or near a site eligible for detour or phasing during the school season to allow normal functioning of the bus stop.
<b>Business Owners</b>	Business uninterrupted; continuous driveway access	Maintain a minimum of one all-weather driveway per business at all times. Use combinations of channelizing devices, barrier, signage, temporary striping, and temporary signals to direct traffic to and from business driveways. Keep business informed of changing traffic patterns.
<b>Hospitals</b>	Access for quick response times; continuous driveway access	Maintain hospital routes through the site at a staged bridge location or with temporary signs through detour routes on applicable detours wherever bridge reconstruction is on a hospital route. Provide access that allows emergency services to maintain fast response times.
<b>Farmers</b>	Uninterrupted activities; continuous access to fields	Provide continuous access to property. Coordinate with farmer to provide alternate access points when necessary. Provide accommodations for the Older Order Communities per TP Attachment 10-1.
<b>Local Residents</b>	Continuous access to residential properties	Provide continuous access to property by incorporating the driveway into the traffic pattern using combinations of channelizing devices, barrier, signage, and temporary signals. Provide a temporary driveway connection when necessary.
<b>Other Patrons</b>	Varying needs (Older Order Communities, neighborhood associations, rails to trails, etc.)	Review requests for consideration. When practical, accommodate reasonable requests. When impractical, inform the group, applicable local governments, and PennDOT of the reasoning that the request could not be accommodated and attempt to provide alternate solutions.

## COORDINATION WITH OTHER PROJECTS

PWKP will coordinate TCPs with other projects that are currently under construction or will be under construction. Each Transportation Manager will implement the site-specific TCP at the site level through a full briefing and plan review with the site superintendent, site construction engineer, and any other pertinent staff. PWKP's specific coordination procedures with PennDOT and local governmental and private entities include the following:

- » **PennDOT Projects:** Each Regional Construction Manager will coordinate Project scheduling with PennDOT's regular construction and maintenance program. PWKP recommends establishing monthly coordination meetings with PennDOT in each region during construction operations to discuss coordination of upcoming projects. In the event a schedule change causes conflict with PennDOT's normal construction or maintenance programs, the Regional Construction Manager will meet with appropriate PennDOT personnel to discuss a mutually agreeable solution.
- » **Local Government Projects:** Each Transportation Manager will coordinate scheduling with local municipal projects. The TCP for the bridge site will address local governmental entities' scheduled projects. PWKP will make every attempt to avoid scheduling conflicts with local municipal projects. In the event a schedule change causes conflict, the Regional Construction Manager will immediately notify any affected local entities and work to favorably resolve any impacts to local municipality projects.
- » **Private Projects:** PWKP will identify potentially impacted private projects through PWKP's Public Information Coordinator and contact the affected private project entity. Based on these discussions, PWKP will assess the validity and magnitude of potential impact to the private project. PWKP will then work to eliminate or mitigate potential conflicts with the private project through coordination, negotiation, design changes, or schedule changes. The Regional Construction Manager will inform PennDOT in writing regarding the outcome of any discussions with entities involved in potentially impacted private projects, or on unsuccessful attempts to make contact.



### LOCAL PRESENCE AND ESTABLISHED RELATIONSHIPS

PWKP's three-region management approach maximizes use of the team's local presence. PWKP has established relationships in each region while having completed hundreds of projects throughout Pennsylvania, and successfully coordinating with other PennDOT, local government and municipalities, and private projects.

## LOCAL ORDINANCES

All local ordinances including city, borough, and township noise ordinances will be identified so they can be incorporated into the plans for each bridge replacement site and applied to the Project schedule if necessary. PWKP will ensure that all local ordinances are obeyed throughout design, construction, and maintenance, and will contractually obligate all subcontractors to obey local ordinances. PWKP's regional staff will be responsible for ensuring that all Project sites are in compliance with local ordinances.

A thorough compilation of pertinent local ordinances will be assembled during the design phase. Impacts on design, construction, or maintenance will be incorporated into the design and work planning for each location. This thorough planning will ensure that PWKP is able to comply with all local ordinances and that work forces understand the ordinances and prepare to comply accordingly.

## PENNDOT SNOW PLOWING & MAINTENANCE OPERATIONS

PWKP understands the magnitude of PennDOT's winter road maintenance program and has formulated a schedule that adds little or no interference to normal operations by minimizing winter construction. Traffic control implementation start dates are after March 15<sup>th</sup> in most cases, near the end of the typical winter maintenance season. Traffic control completion dates are prior to November 15<sup>th</sup> in most cases, before winter maintenance becomes heavy. Traffic control will always be in adherence to the limitations set forth in TP Attachment 10-1.

PWKP's minimization of lane restrictions and traffic control devices on the highways during the winter

period ensures that PennDOT remains effective at winter maintenance during the Project. In situations where work must take place in the winter months, PWKP will take additional measures, such as additional sandbagging, to safeguard traffic control devices from being disabled by winter road maintenance operations and will inspect the devices more frequently during winter construction to enable more timely repairs of disabled devices.

PennDOT Maintenance will have the opportunity to discuss concerns for the construction period during development of TCP for any individual site. During construction, PWKP will be responsible for maintenance activities within the site limits, but will be ready to coordinate with nearby PennDOT maintenance activities. PWKP's TCPs for the maintenance period will also include input from PennDOT Maintenance. Routine and renewal maintenance schedules during the Maintenance Period will be coordinated with PennDOT Maintenance to eliminate schedule overlaps.

## CONTINUOUS ACCESS TO ESTABLISHED TRUCK ROUTES AND HAZARDOUS MATERIAL ROUTES

During TCP development for each Replacement Bridge requiring a detour plan, PWKP's design team will review established truck and Hazardous Materials routes to determine if they are impacted by the proposed detour. PWKP will reference the approved Surface Transportation Assistance Act (STAA) truck route map and PennDOT's Publication 411 to identify these routes. If required, a secondary truck/Hazardous Materials detour will be posted to maintain traffic for these special vehicles.

Careful consideration of truck and Hazardous Material routes while scheduling the bridge replacements will ensure that concurrent detours do not create a discontinuity in a truck or Hazardous Material route. Detour routes will be checked for compliance with approved Truck and Hazmat routes. At locations using staged construction, the temporary lane widths will be matched to the required route width.

## NIGHT WORK

Night work may be required in some instances that may cause too much traffic disturbance during the day, such as traffic switches, beam removal, beam erection, maintenance work in temporary lane closures, emergency repairs, and emergency preparation. Construction of overpass bridges or railroad overpasses may also be required to be performed at night.

In these cases, PWKP will implement the necessary requirements referenced in Publication 213 and NCHRP Report 498 – Illumination Guidelines for Nighttime Highway Work. Notably, PWKP will position lights in a manner to not disturb the sight of motorists, and flaggers will wear Type 3 reflective garments to remain highly visible.

Noisy operations such as impact demolition and pile-driving will not be scheduled for night work unless contract requirements or other situations preclude the carrying out of daytime work. All night work will be coordinated with PennDOT.

### SIGN FOR EACH REPLACEMENT BRIDGE



Prior to construction, PWKP will place a sign similar to the one pictured below at each bridge replacement site to inform the public that the site is part of the Pennsylvania Rapid Bridge Replacement.





# Preliminary Safety Plan

## PRELIMINARY SAFETY PLAN

**With experience safely replacing hundreds of bridges in Pennsylvania, Plenary Walsh Keystone Partners (PWKP) understands safety concerns inherent in bridge construction and maintenance. Safety records for Walsh Construction and Granite are consistently among the best in the industry, underscoring PWKP’s commitment to safe project delivery for its workforce and for the public. As a part of this commitment, the PWKP team will integrate subcontractors into safety processes, including orientation, weekly meetings, and Project Goals.**

PWKP team members share an uncompromising safety philosophy that is focused on their greatest responsibility: the safety of the workforce and the public. The principles of Walsh Construction’s and Granite’s safety programs, along with the best practices of PWKP’s exclusive major subcontractors, will be melded together into a comprehensive Project Safety Plan, with subcontractors indoctrinated into a shared safety culture. To protect life, health, and general occupational welfare of the workforce, all personnel are involved in pre-planning efforts to minimize risk and protect people.

PWKP commits experienced safety professionals including Safety Manager, Ed Buffington, and Deputy Safety Manager, Pete Hamilton. PWKP will assign regional safety staff to support Ed and Pete to continuously mentor, advise, and train personnel and subcontractors. The Construction Joint Venture (CJV) Executive Committee oversees safety to ensure independence from production. This overall structure reinforces PWKP’s oversight, control, and support of safe work practices and encourages its safety culture across all team members at all bridge sites. Ed and Pete will be involved during design to incorporate the safety perspective as an integral part of the design process



### SKILLFUL SAFETY LEADERSHIP

Ed Buffington serves as PWKP’s Safety Manager. Ed holds the designation of Certified Health and Safety Technician (CHST), which ensures a consistent level of leadership and technical skill. Deputy Safety Manager, Pete Hamilton, will support Ed in safety leadership across the Commonwealth. Additionally, each region will be assigned a Regional Safety Manager to provide thorough oversight of each site.

with constructability reviews and maintenance considerations all taken into account.

### SAFETY PROCEDURES, POLICIES, TRAINING, AND ENFORCEMENT PROGRAMS

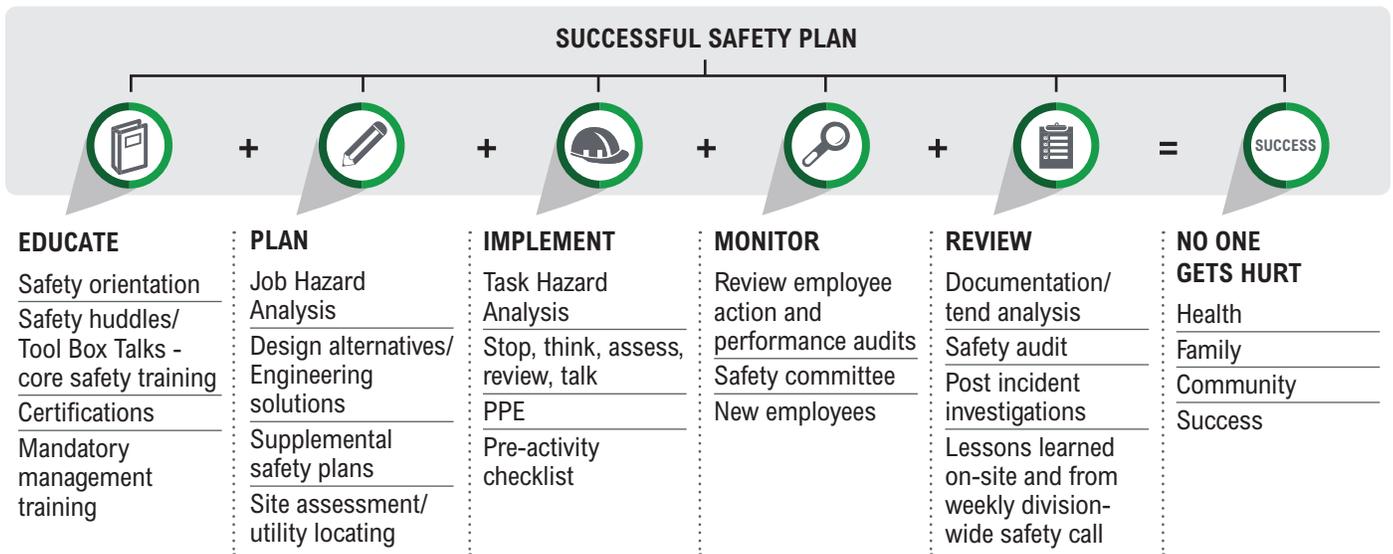
The Safety Team, along with design, construction, and maintenance leads, will develop and submit to PennDOT a comprehensive Safety Plan that complies with Technical Provision (TP) and OSHA requirements as well as all applicable Federal, State, and local laws and regulations, provisions, and policies governing safety and health. PWKP’s Project Safety Plan will be consistent with the Preliminary Safety Plan presented in this section.

An incident-free, zero accident Project is PWKP’s number one goal. PWKP’s Project Safety Plan will provide clear procedures and policies that employees and subcontractors will follow at all times and at all work locations, including:

- » Emergency procedures and protocols
- » Drug/alcohol testing program
- » Safety training
- » High-visibility apparel and other personal protective equipment (PPE)
- » Hard hat areas
- » Traffic control procedures
- » Fall protection
- » Certifications and personnel qualifications
- » Enforcement and incentive programs for continuous improvement and positive safety behaviors
- » Materials, equipment, and protective devices
- » Oversight and reporting protocols
- » Safety project controls, including tracking, documenting, and reporting compliance

**Figure 4.5–1** illustrates the key components of PWKP’s Safety Plan approach.

**FIGURE 4.5-1 PWKP'S PLAN FOR SAFETY SUCCESS**



 Through experience replacing thousands of bridges, PWKP knows what measures must be in place at every bridge site. Prior to beginning construction at a site, PWKP’s Safety Manager will work with regional safety managers and site project management to create a site-specific safety plan. This plan will include all of the provisions of the overall Safety Plan, and provides specific safety procedures and protocols to address site working conditions and hazards; reporting lines and procedures; and emergency preparedness and response.

All of these safety procedures and policies will be communicated throughout the Project organization through preconstruction planning, maintenance workshops, and site-specific orientation. All staff, subcontractor employees, inspectors, and PennDOT staff will receive a safety orientation before working at each site. Orientation will include training on specific or unusual

hazards associated with the bridge site; procedures for reporting accidents; locations and availability of medical facilities; and set the expectation that every individual on site is responsible for accident-free operations.

PWKP acknowledges that this Project will involve a workforce with varying levels of experience working for many subcontractors. Part of new hire orientation includes the site superintendent orienting the worker to the jobsite and the individual’s work assignment.

The success of any safety plan is dependent upon management, field personnel, and safety personnel working together to continuously improve. Safety training highlights that will help PWKP’s team continuously improve are:

- » Confined space training for construction and inspection operations of any confined spaces
- » OSHA 30-hour training
- » OSHA 10-hour training
- » Flagger training
- » Signal person training
- » First Aid/CPR/BBP/AED
- » Weekly safety huddles to discuss specific safety issues and best practices
- » Operational/equipment-specific training
- » Defensive driving
- » Crane safety awareness
- » ATTSA supervisor training (for personnel responsible for traffic management and control)

**FALL PROTECTION** Employees working above six feet will be required to wear fall protection.



PWKP regional safety staff will visit each active bridge replacement site within their respective region at least once per week during construction to reinforce proper safety behaviors and review performance. These safety professionals will:

- » Review jobsite and task hazards with the superintendent, and discuss methods to eliminate or mitigate risks
- » Attend site safety meetings and offer suggestions for improvements
- » Facilitate safety training
- » Perform safety walkthroughs and address any areas in need of improvement
- » Perform site safety audits and report audit findings to the Safety Manager and to higher level staff such as the Regional Construction Manager, or the Construction Manager, Joe McIlhinney

During the Maintenance Period, the Maintenance Manager and Inspectors will perform these duties on a daily basis with the use of Job Task Analyses and Job Hazard Analyses; weekly during tool box talks; and monthly during safety meetings. The Safety Manager will monitor safety performance through monthly safety reports and will visit the bridge site periodically to review and reinforce proper safety behaviors and review performance.

PWKP will use a behavior-based observation process designed to highlight both proper and improper behaviors and to coach participants to make the appropriate behavior decision. This program will be based upon

**SAFETY DEMONSTRATION** Regional safety staff will facilitate safety training that is practical and hands-on.



the successful REAP (Review Employee's Actions and Performance) program established by Walsh Construction that focuses on daily employee interaction, coaching, and recognition to promote safety actions and practices.

## INDUSTRIAL SAFETY RECORD (FORM D)

Form D, Industrial Safety Record, has been completed by all Major Participants who will perform or supervise installation or construction work for the Project. These forms are included in Volume 1 of this submittal.

## GOVERNMENTAL ENTITIES COORDINATION

Providing public and workforce safety is a coordinated effort between PWKP and its subcontractors, PennDOT, local municipalities, and emergency service providers. PWKP's safety pre-planning will proactively include local emergency service providers and governmental entities. The project team will invite all appropriate entities to tour the work location to become aware of the specific routes of response and potential hazards. They will be briefed on site specifics that may require special planning, such as bridges over fast or deep water, bridges over or on high-speed highways, or bridges with utility safety concerns. Other specific safety concerns include:

**Fire Coordination:** PWKP will work with fire departments to ensure their access to fire hydrants at all times. PWKP will prohibit vehicle parking and material storage within 15 feet of a fire hydrant, and measures such as signage or caution tape may be used to ensure compliance. Every site will have fire extinguishers at easily accessible locations, and will always have a fire extinguisher near hot work such as welding.

**Site Security Coordination:** PWKP will inform law enforcement and other governmental entities of specific site security or public safety concerns. Construction and maintenance work will be conducted in a way that minimizes hazards to people working on the site and to the public. Sites will be left secured and properly barricaded at the end of each work shift to prevent public access.

**Life Safety Coordination:** PWKP will work with emergency medical services, law enforcement, and governmental entities to ensure neither employees nor

the public are exposed to hazards caused by construction or maintenance activities. Planning for prevention and having a thorough plan for emergencies will ensure that each bridge is built and maintained with the least amount of risk for injury.

Well-planned emergency and incident management efforts contribute to quick, successful emergency response, and prepares employees to respond appropriately to the variable situations of an incident or emergency. When starting work in a new location, safety staff will perform the following planning measures:

- » Identify the location of, and most expedient route to, the nearest medical facility
- » Obtain local emergency services contact numbers, distribute the list to all contractors and subcontractors that will be working at the site, and ensure that the list is posted in visible locations.
- » Identify and train employees on job-specific emergency measures such as employee rally points, EMS meeting points, first aid kit locations, defibrillator locations, fire extinguisher locations, etc.

Site managers will notify local governments, police departments, fire departments, and emergency medical services local to each bridge replacement of construction activity, and review risks and potential emergencies that may require emergency response. PWKP's Safety Plan will address procedures for immediately notifying PennDOT of all incidents arising out of or in connection with performance of the Work, whether on or adjacent to the Project.

**SAFETY COORDINATION** Granite held a Safety Week on the Tappan Zee Bridge Design-Build, part of an ongoing effort to coordinate with first responders and emergency services, both on land and marine.



## TRACKING, DOCUMENTING, AND REPORTING SAFETY COMPLIANCE

PWKP will perform hazard analyses to identify specific jobsite and task safety risks and eliminate or mitigate hazards. This hazard analysis will be performed on both a job level and a task level. Superintendents will perform a Job Hazard Analysis (JHA) for their work activities and review them with jobsite personnel and PWKP regional management and safety staff. Foremen will perform a Task Hazard Analysis (THA) for each specific task to be performed by each crew per shift. The site superintendent will be involved with the THA process by monitoring the planning and execution of tasks performed by each crew.

Project management from each site will be required to track and document all incidents, near misses, completed training and meetings, and corrective measures to any safety deficiencies. The project team will submit safety reports weekly during construction and monthly during maintenance to the PWKP Safety Manager for review. PWKP safety staff will monitor the reports and utilize them, along with site visits, to document and enforce safety compliance. Safety compliance records will be stored in the EDMS.

## INCORPORATION OF AUDIT FINDINGS

Through close oversight by its regional staff, PWKP will identify any under-performing sites with employees exposed to hazards. These sites will be more closely monitored, and the site's responsible project manager or safety manager will be engaged by PWKP's regional staff or Safety Manager to formulate resolutions to the site's poor safety performance.

PWKP will perform a safety walkthrough and audit at each bridge replacement site at least once per week. Most minor safety concerns will be addressed on the spot with the site's foreman or superintendent. Major safety concerns will be cause to stop work and engage the subcontractor's higher level project management and safety management to modify such equipment, devices, and job procedures to eliminate the concern.

Audit findings will be compiled and stored in the EDMS, and reviewed with site safety management. PWKP will make the expectation clear that noncompliance of safety rules will not be tolerated and all contractual repercussions will be applied.



# Preliminary Public Information and Communications Plan

## PRELIMINARY PUBLIC INFORMATION & COMMUNICATIONS PLAN

PWKP's goal is to establish and maintain positive relationships with the public and PennDOT. Clear, consistent, and timely communication is crucial to facilitating a Project that minimizes inconveniences and impacts to the community. PWKP will use of a variety of communication platforms and face-to-face meetings with affected Customer Groups to encourage public understanding, awareness, and support of the Project and PennDOT Goals.

This multi-asset, multi-location Project requires a highly-coordinated public information and communication (PIC) effort between PennDOT and PWKP on a statewide, regional, and jobsite level. To achieve the PIC goals, PWKP will work with PennDOT, residents, and other Customer Groups to:

- » **Maximize positive public involvement** throughout all phases of the Project through participation in outreach meetings, special focus committees, and special events.
- » **Minimize inconvenience to the public** through comprehensive, inclusive communication efforts that inform and prepare those directly affected by construction and maintenance activities.
- » **Assist PennDOT in educating the public** on the Project's importance to the region's mobility and economy.
- » **Provide high-quality support**, including written and illustrative materials that are ready to publish.

Leading the PIC team for PWKP is Dan Galvin, Public Information Coordinator. Dan will establish the PIC office in Harrisburg that will serve as the hub for residents and other Customer Groups to obtain Project information. He will also establish and respond to the 24-hour telephone hotline; being directly available to callers during normal business hours and responding to all voice mail messages within 24 hours.



Dan will be supported by Kurt Knaus of Pennsylvania-based public relations firm Ceisler Media and Issue Advocacy (CMIA). Each of the three PWKP management regions will also have a public information coordinator to support PIC efforts at each bridge replacement site during construction. Every bridge site will designate a point person for on-site PIC responsibilities, who will provide the public information team with updates on site progress and traffic control.



### PWKP EXPERIENCED COMMUNICATIONS

#### + Public Information Coordinator, Dan Galvin:

Dan brings more than 20 years of relevant experience and has built positive relationships on complex design-build projects: SR 520 in Washington, I-64 in Missouri, and I-494 in Minnesota. Through roles as community relations director for the Arizona DOT and as a news anchor, Dan is comfortable interacting with mass media and understands DOT public involvement priorities.

#### + Deputy Public Information Coordinator, Kurt

**Knaus:** Kurt is a lifetime resident of Pennsylvania with two decades of experience in journalism, media relations, and government communications. Kurt works for Ceisler Media and Issue Advocacy (CMIA), which has offices in Pittsburgh, Harrisburg, and Philadelphia. CMIA will support the Project as needed with additional personnel and resources.

Dan Galvin will collaborate with PennDOT to develop a PIC Plan that will guide this joint effort. The PIC Plan will identify communication strategies and actions to deliver a consistent message in all public involvement, public outreach, and communication activities. The PIC Plan will address:

- » Roles and responsibilities
- » Project summary for each bridge site
- » List of affected Customer Groups
- » Communications plan and timeline to keep the public, stakeholders, and PennDOT informed of Project activities and progress
- » Milestones for updates to the PIC Plan
- » Performance-monitoring processes and tools

PWKP management will support the integrated PIC efforts as needed through interactions with the community, attendance at events, and communication of Project details and schedules.

## IDENTIFYING CUSTOMER GROUPS

To identify Customer Groups per bridge replacement location, PWKP will consult with a number of agencies, organizations, and other resources, including:

- » PennDOT, Metropolitan Planning Organizations (MPO), and Rural Planning Organizations (RPO)
- » Local officials, school officials, emergency service providers, and religious leaders
- » Internet searches and local newspapers
- » Industrial and economic development organizations and local chambers of commerce
- » Local colleges and universities
- » Surveys conducted with resource agencies
- » Local Councils of Government

PWKP will create and maintain a Customer Group database that will be shared with PennDOT. This database will include contact information, outreach and engagement activities for each group, and poll/survey results to measure the effectiveness of outreach efforts.

## OUTREACH & ENGAGEMENT

Positive interactions with Customer Groups during design and continuing through construction and maintenance will be important for developing community understanding, awareness, and support. PWKP’s approach to outreach and engagement includes:

- » Coordinating efforts with PennDOT’s public involvement team as well as MPOs and RPOs.

- » Building support and maintaining a partnering relationship with affected communities.
- » Communicating inclusive of all Customer Groups, including traditionally under-served populations.

PWKP will organize and lead Public Officials Meetings and Public Meetings where PWKP design, construction, and PI staff will present high-quality and meaningful slides, boards, graphics (Figure 4.6–1), and written materials, approved by PennDOT, that clearly explain major aspects of the Project, including:

- » Design and construction issues affecting adjacent residential and business areas
- » Detour design and implementation
- » Project schedule and planned execution
- » Bridge replacement techniques, including strategies for traffic control, minimizing noise and dust, and environmental mitigation

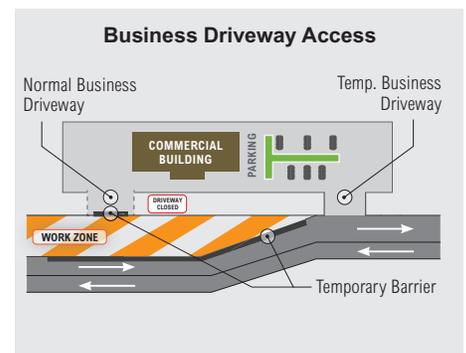
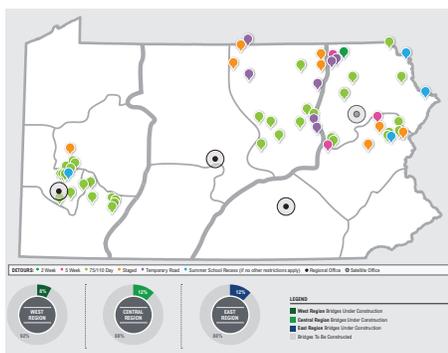
These meetings will occur prior to any full bridge closures and will likely be grouped by county. PWKP will advertise these meetings in local newspapers, through the Project website, and through social media. The focus of these meetings will be to educate and inform, and also to listen and respond to questions or concerns.



PWKP will hold two public open houses each year in each region—once in the spring and once in the fall—as a way to preview upcoming construction activity and summarize construction completions on a regional basis. Additionally, PWKP will assist with planning special events, special purpose

**FIGURE 4.6–1 ENHANCING PUBLIC SUPPORT THROUGH USE OF VISUALIZATION TECHNIQUES**

Visualization experts from PWKP member firms will provide effective concept graphics, 3-D renderings, and technical illustrations to facilitate communication between PennDOT, Customer Groups, and technical designers.



**Concept Graphics** depict abstract information such as schedules, maps, and options to facilitate collaborative discussion and decision-making.

**3-D Renderings** communicate real-world changes in specific areas and show how a new design will look once it is built.

**Technical Illustrations** depict technical concepts to effectively communicate to a non-technical audience.

meetings, and speaking engagements as requested by PennDOT. Key staff will be available to attend public meetings and special events, including the ground breaking and ribbon cutting ceremonies.



PWKP will conduct working meetings with emergency services and local governmental agencies to help prepare for potential emergency events during construction. PWKP will also initiate a Customer Group Committee as a forum to encourage discussion among Customer Groups, PennDOT, and PWKP. At these monthly meetings, PWKP and PennDOT will get feedback on perceived impacts on traffic, business access, and overall quality of life, with potential solutions. PWKP will also be able to provide information regarding upcoming activities and discover any potential conflicts.

PWKP will incorporate use of appropriate communication tools to reach out to Environmental Justice (minority and low income) populations, Limited English Proficiency populations, and other groups that may require special accommodations including the Amish, Native Americans, senior citizens, and the disabled. Specific, inclusive communication efforts provide comprehensive and useful design, construction, and maintenance information to reach the widest-possible audience. With PennDOT’s guidance

and approval, PWKP will write user-friendly content, develop graphics, and facilitate the use of a variety of communication tools, such as:

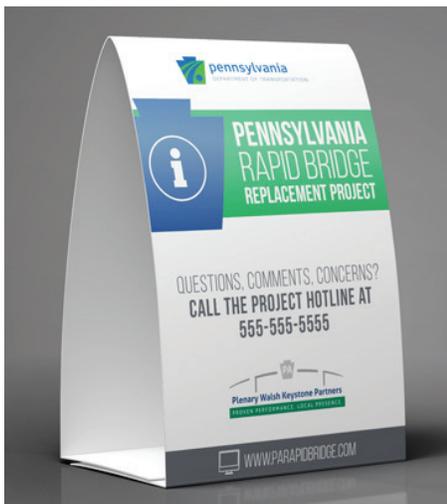
- » Direct mail
- » Flyers and posters
- » Newspaper advertisements
- » Public service announcements
- » Road signs
- » Telephone hotline
- » Quarterly newsletters
- » Brochures/flyers
- » E-mail blasts
- » Text messaging
- » Social media
- » Highway Conditions Reports (HCRs)
- » Display booths
- » Presentations
- » Project website
- » Mobile phone apps
- » Public postings

PWKP will continuously audit the performance of activities of the PIC Plan. PWKP will actively solicit public input and encourage those with inquiries or concerns to contact Dan Galvin directly. All feedback obtained by the public information team will be used to gauge the public’s perception of Project progress. As needed, PWKP will make changes to the PIC Plan to adapt to the changing goals and needs of the Project, including public reaction to impacts and the actual depth, breadth, and frequency of information required by Customer Groups. PWKP will document the efforts and results of the PIC Plan in measurable terms to clearly indicate compliance and progress.



**STRATEGY FOR CONSISTENT MESSAGING**

PWKP will produce all communication pieces to have a consistent look that quickly identifies it as information related to the Pennsylvania Rapid Bridge Replacement Project. These pieces will be used to show detour routes or other information, while promoting the Project website, hotline, and social media.



**Table Tents:** Table tents can be placed on restaurant tables or distributed to community centers and libraries to reach a wider audience.



**Road Signs:** At each Replacement Bridge, PWKP will place a sign designating the site as part of the larger Project program.



**Information Boards:** Information boards can be placed at high-traffic areas, such as shopping malls, libraries, and other institutions.

## COMMUNICATING PROJECT ACTIVITIES AND IMPACTS

The increase in construction activity over the Project's 36-month duration will likely increase public interest and concern over impacts to commutes, businesses, and communities as a result. Through effective and purposeful communication, PWKP will work to keep residents, businesses, and other Customer Groups informed in advance whenever possible so that potential impacts are minimized and public expectations of the Project, PennDOT, and PWKP's crews continue to be positive. Central to this effort, PWKP will:

- » Evaluate issues and features (such as parks, trails, playgrounds, schools, and views) important to the affected communities to understand the Project's potential impact.
- » Communicate frequently and honestly with local residents using methods most appropriate for the community's needs.
- » Encourage public education on Project issues.
- » Remain flexible and incorporate local recommendations when reasonable and practical.
- » Train staff to facilitate win-win solutions through creative and collaborative problem solving.

During design, PWKP's PIC Team will work to educate Customer Groups on upcoming activities and impacts during construction. During construction and maintenance, Customer Groups will be continually updated on Project status, including upcoming lane closures and detour routes.



**PROJECT WEBSITE** An easy-to-use website will provide Project details including maps, fact sheets, construction updates, commute options, photos, schedules, public meeting notices, newsletters, and e-mail links to the public information office.



## EFFECTIVELY MANAGING PUBLIC EXPECTATIONS

PWKP will follow PennDOT's Publication 295 to ease impacts to Customer Groups through design, construction, and maintenance:

- ✓ Provide businesses, school districts, residents and commuters with timely information.
- ✓ Be responsive to complaints.
- ✓ Let drivers know what to expect.
- ✓ Develop and implement plan for maintenance and protection of traffic.
- ✓ Develop and implement crisis management plan.
- ✓ Be familiar with PennDOT policies and procedures regarding media relations.
- ✓ Work with businesses to maintain access during construction.
- ✓ Work to accommodate special community events.
- ✓ Restrict construction to non-peak traffic hours and times when school is not in session, whenever possible.
- ✓ Complete work in a timely fashion.

## LANE CLOSURES AND EMERGENCY EVENTS

Through coordination with the Traffic Management Technical Work Group (TWG), Dan Galvin will be kept abreast of all construction traffic information so he can effectively lead communication efforts. He will compile and coordinate all bridge site information to publish on the Project website; respond to e-mail; distribute to mass media; or publish in the quarterly newsletter. PWKP's goal will be to provide adequate notice to travelers of impending traffic impacts and provide alternatives so that they may avoid some or all of the related inconvenience.

PWKP will target specific audiences with communication materials to alert them to upcoming overnight or long-term lane closures:

- » Distribute flyers to neighborhoods adjacent to the bridge replacement site
- » Distribute business letters to affected businesses
- » Provide regular updates to trucking companies and large freight carriers in the area
- » Place maps and brochures at tourist areas

Two weeks prior to the implementation of any construction-related lane or road closure PWKP will place

signs alongside the affected roadway notifying the traveling public of the upcoming work. This communication will be supplemented by press releases to local news media outlets, information posted to the Project website and social media platforms, and weekly construction e-mail updates to contacts in the Customer Group database.

PWKP will be proactive in keeping PennDOT informed of traffic impacts, by providing:

- » A weekly construction schedule, with additional updates more frequently when necessary.
- » Traffic congestion mitigation recommendations with an initial mitigation report provided early in the Project and updated periodically to allow early notice to the community.
- » Information regarding traffic conditions, maintenance of traffic, and access to residential and business properties
- » Information regarding coordination with other area construction projects

In cases of major vehicle collisions, ice/snow conditions, or Hazardous Material spills, PWKP's Safety Manager will notify the Public Information Coordinator. Once the incident level, cause, estimated duration, and resolution are determined, the Public Information Coordinator will report to PennDOT public information staff and distribute information to the news media if necessary and agreed to by PennDOT. PWKP PIC staff will update the website and distribute any pertinent information to the Project e-mail list.

In the event of a construction-related incident, such as an interruption to utilities through a power line or water main break, the utility company involved will determine the area affected. Then, the public information team will notify area residents and businesses. This notification will be made through direct contact by going door to door, meeting with people, and/or through messages posted on the Project website and telephone hotline. In addition, if the incident warrants and if agreed to by PennDOT, the news media will be notified through press releases and telephone calls.

PWKP will coordinate messaging with PennDOT when using the following modes of communication that can play an especially important and helpful role in providing critical, up-to-the-minute details during specific Project emergencies:



**EMERGENCY COMMUNICATIONS** Dan Galvin, pictured below addressing the media, is adept at handling an emergency. On the I-64 Design-Build project, an emergency road closure required continuous response—media briefings, press conferences, interviews, and local government and DOT coordination.



**Mass Media:** Most people are accustomed to getting the latest traffic information from local television and radio stations. With the PWKP team's news media experience and that of PennDOT's public affairs staff, working with the local news media will be a regular and ongoing activity and an especially important one in cases of an emergency.

**Social Media:** A Facebook page and Twitter feed will supplement the Project's website, to provide the public with real-time information. Twitter in particular can be quite useful in disseminating information in an emergency or in the event of a sudden change in construction plans or traffic control. Social media will also be used to disseminate traffic information during the Maintenance Period.

**Portable Changeable Message Signs:** These boards are quick and easy to set up and operate by battery power pack. Message boards can communicate emergency situations requiring immediate action.

PWKP will focus on maintaining communication with local governments and emergency service providers to lessen any possible impact to services or public safety. Fast response to emergencies is of paramount importance; therefore, throughout each bridge's replacement duration, PWKP will be in regular contact with all emergency service agencies.



# Design-Build Technical Solutions

## DESIGN-BUILD TECHNICAL SOLUTIONS

PWKP's design and construction solutions avoid and minimize encroachment on utilities and third party property, streamline construction logistics, ensure quality management, and accelerate permitting and construction. PWKP selected effective design-build solutions for all 558 bridges, ensuring substantial completion by December 31, 2017, high-quality construction, and minimized user impacts during the construction and maintenance periods.

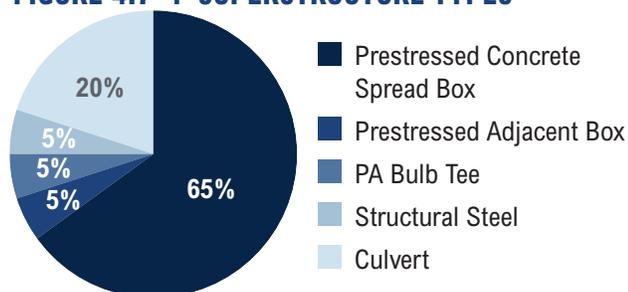
### REPLACEMENT BRIDGE STRUCTURES

PWKP will prepare bridge and related structure designs in accordance with Section 12 of the Technical Provisions, as well as Sections 8, 10, 11, and 14. As required in Section 12, PWKP is committed to producing bridge designs that are also in accordance with PennDOT's Publications and Active Strike-off Letters, except where modified by the Exhibits.

 PWKP's design approach considers the optimum durability of the replacement bridges and other elements, and simplicity of design, in order to minimize the need for routine, renewal, replacement, and rehabilitation maintenance work, and to maximize the availability of the Project during the Term. This can be accomplished by many means, but where possible PWKP has focused on typical PennDOT structure types that are proven to have low maintenance and low construction costs for PennDOT.

PWKP categorized the type of bridge design proposed for this project according to superstructure type, as shown in **Figure 4.7-1**.

**FIGURE 4.7-1 SUPERSTRUCTURE TYPES**



### PWKP'S DESIGN AND CONSTRUCTION TEAM

- + Absolute dedication, consistency and continuity of team members beginning during the Proposal and continuing through all phases of the project
- + Walsh's expertise in bridge construction as demonstrated through the 2013 ENR ranking as #1 Largest U.S. Bridge Builder
- + Granite's bridge and highway construction success as demonstrated through the 2013 ENR ranking as #5 Transportation Contractor
- + HDR's design experience on the Oregon Bridge Delivery Program and in all 11 PennDOT Districts
- + TRC's unmatched experience in PennDOT inspection and testing
- + A.D. Marble's extensive experience in PA permits and NEPA process
- + Key personnel and TWG Managers with national design and construction of rapid bridge replacements to offer tested and proven solutions
- + ICE's design and management experience on the Missouri Safe & Sound Program

### Preliminary Bridge Schematic

Preliminary bridge schematics for the various bridge types, including general bridge superstructure, substructure, foundation and other component types being considered for use by PWKP can be found in Volume 2: Appendix.

### ALTERNATIVE TECHNICAL CONCEPTS (ATCS)

PWKP developed ATCs with the primary goals of expediting bridge replacements, reducing construction costs, minimizing impacts to traffic, and reducing maintenance requirements. **Table 4.7-1** outlines the submitted and approved ATCs, and their benefit to the Project.

**TABLE 4.7-1 KEY ATC APPROVALS**

PWKP ATC #	DESCRIPTION	BENEFIT TO PENNDOT
1	Standard slope widening details	<ul style="list-style-type: none"> <li>» Reduces design time and review time by decreasing number of submittals</li> <li>» Requires fewer geotechnical borings, reducing costs</li> <li>» Incorporates recycled concrete or locally sourced stone to reduce truck traffic and volume of disposal, thereby reducing costs</li> </ul>
2	Illinois SM Rail	<ul style="list-style-type: none"> <li>» Reduces construction duration to minimize impacts to traffic</li> <li>» Reduced bridge deck width and easier repairs to yield reduced life-cycle costs</li> <li>» Reduces width of bridge to minimize ROW and environmental impacts</li> </ul>
3	Modification to approach slab length	<ul style="list-style-type: none"> <li>» Shortens construction duration for 75% of the project bridges</li> <li>» Smaller footprint minimizes ROW and environmental impacts</li> </ul>
4	Prefabricated modular wall abutments	<ul style="list-style-type: none"> <li>» Reduces impacts to adjacent streams</li> <li>» Reduces maintenance costs with shorter bridge length than standard PennDOT integral abutment and highly durable concrete panels</li> <li>» Prefabricated elements expedite schedule</li> </ul>
7	Construction joint spacing	<ul style="list-style-type: none"> <li>» Allows majority of abutments to be cast in a single pour to expedite construction</li> <li>» Reduces potential for leakage, cracking, and deterioration</li> </ul>
8	Polyester polymer concrete	<ul style="list-style-type: none"> <li>» Eliminates the need for intermediate overlay during the Term</li> <li>» Prolongs the life expectancy of the bridge by preventing moisture and corrosive substances from penetrating the deck</li> </ul>
12	Box beams w/ UHPC-jointed composite decks	<ul style="list-style-type: none"> <li>» Reduces construction time by eliminating on-site deck casting/curing period</li> <li>» Achieves a fully composite deck with a superstructure that can be constructed and opened to traffic quickly</li> </ul>
14	Vertical concrete parapet	<ul style="list-style-type: none"> <li>» Reduces width of bridge to minimize ROW and environmental impacts</li> <li>» Minimizes maintenance costs by reducing bridge width</li> </ul>
15	PCI NE Precast Bridge Barrier	<ul style="list-style-type: none"> <li>» Reduces construction time by eliminating on-site barrier and curing periods</li> <li>» Reduces traffic impacts by eliminating deck overhang forming</li> </ul>
17	Modular precast substructure system	<ul style="list-style-type: none"> <li>» Greatly reduces construction time by using precast elements</li> <li>» Enhances QC and reduces cost of inspection and testing by using precast</li> <li>» Creates opportunities for local subs by using smaller precast components</li> </ul>
18	Increased depth of integral abutment capbeam depth	<ul style="list-style-type: none"> <li>» Increases number of bridge sites where integral abutments can be used</li> <li>» Minimizes impacts by reducing total bridge length and required excavation</li> <li>» Minimizes stream impacts</li> </ul>
20	Interior pile bents	<ul style="list-style-type: none"> <li>» Reduces construction duration to minimize impacts to traffic</li> <li>» Minimizes concrete ready-mix truck traffic</li> <li>» Reduces the footprint of stream impacts by eliminating the need for temporary dewatered cofferdams during interior bent foundation construction</li> </ul>
22	Criteria for integral bridge movement limits-approach slabs	<ul style="list-style-type: none"> <li>» Reduces construction duration and impacts by eliminating approach slabs for many of the integral bridge sites</li> </ul>
23	Hydraulic survey requirements	<ul style="list-style-type: none"> <li>» Reduces the amount of fieldwork required to establish survey site lines</li> <li>» Limits the access needs for survey crews</li> </ul>

### Bridge Geotechnical Related Issues

Based on a detailed review of available subsurface information and site visits, PWKP compiled a summary of existing conditions at each structure and a preliminary assessment of suitable replacement foundation types for each structure.

### FOUNDATION TYPE SELECTION

PWKP preliminarily assigned foundation types based on the overburden thickness between the Proposed Bottom of Footing Elevation (PBFE) at each replacement substructure unit and the average Top of Rock Elevation (TRE) at the site. PWKP considered the following foundation types:

- » Spread footings on soil or rock
- » Steel end-bearing or friction H-piles
- » Micropiles in rock

Drilled shafts in rock were not considered given the limited information on bedrock. PWKP calculated preliminary factored bearing resistances in order to estimate preliminary foundation quantities. These calculations used the methodologies specified in Section 8 of the Technical Provisions, AASHTO LRFD 2010 requirements, and materials present at each bridge site.

### FUTURE INVESTIGATIONS AND GEOTECHNICAL ISSUES

PWKP will consider karst terrains, stratigraphy including claystone and other slaking rock types, and areas underlain by coal seams or undermining when selecting preliminary foundation types for each structure. **Table 4.7-2** summarizes investigative techniques and remediation strategies that PWKP may use to address these challenges.

**TABLE 4.7-2 PWKP’S APPROACH TO GEOTECHNICAL ISSUES AND INVESTIGATIVE TECHNIQUES**

CONDITION	INVESTIGATION	FOUNDATION ISSUE	REMEDIATION STRATEGY
<b>Swelling/ expansive soil and rock types</b>	<ul style="list-style-type: none"> <li>» Field recon./ mapping</li> <li>» Review USGS swelling clays maps</li> </ul>	Spread footing on rock/soil <ul style="list-style-type: none"> <li>» Uneven support (soil/rock)</li> <li>» Substructure movement</li> <li>» Inadequate bearing resistance</li> </ul>	Spread footing on rock/soil: <ul style="list-style-type: none"> <li>» Over-excavate to stable bearing</li> <li>» Seal/encapsulate deleterious material</li> </ul>
<b>Karst-prone formations (pinnacles, sinkholes, solution cavities)</b>	<ul style="list-style-type: none"> <li>» Field recon./ mapping</li> <li>» Review karst mapping</li> <li>» Geophysical survey</li> <li>» Additional borings</li> </ul>	Spread footing on rock: <ul style="list-style-type: none"> <li>» Uneven support (soil/rock)</li> <li>» Void / collapse under piles</li> </ul> End-bearing piles: <ul style="list-style-type: none"> <li>» Uneven top of rock surface</li> <li>» Void / collapse under piles</li> </ul> Micropiles: <ul style="list-style-type: none"> <li>» Uneven top of rock surface</li> <li>» Uneven bond zone support</li> <li>» Voids under bond zone area</li> </ul>	Spread footing on rock: <ul style="list-style-type: none"> <li>» Over-excavate to stable bearing</li> <li>» Soil removal and cavity grouting</li> <li>» Backfill w/ Class C conc. or coarse agg.</li> </ul> End-bearing piles: <ul style="list-style-type: none"> <li>» Install redundant piles</li> <li>» Pre-drill to stable bearing</li> </ul> Micropiles: <ul style="list-style-type: none"> <li>» Cavity grouting under zone of influence</li> <li>» Cavity grouting in bond-zone area</li> <li>» Construct bond zones below cavity</li> </ul>
<b>Slaking rock (claystone or other deleterious rock types at top of rock or in support interval)</b>	<ul style="list-style-type: none"> <li>» Additional borings</li> <li>» Slake durability testing</li> </ul>	Spread footing on rock: <ul style="list-style-type: none"> <li>» Deterioration of rock under footing</li> <li>» Substructure movement</li> <li>» Inadequate bearing resistance</li> </ul> End-bearing piles: <ul style="list-style-type: none"> <li>» Pile relaxation</li> <li>» Substructure movement</li> </ul> Micropiles: <ul style="list-style-type: none"> <li>» Longer bond zone length required to neglect slaking rock interval</li> </ul>	Spread footing on rock: <ul style="list-style-type: none"> <li>» Over-excavate to stable bearing</li> <li>» Backfill w/ Class C conc. or coarse agg.</li> </ul> End-bearing piles: <ul style="list-style-type: none"> <li>» Install redundant piles</li> <li>» Pre-drill or overdrive to stable bearing</li> <li>» Drive through interval if &lt;2 ft. thick</li> </ul> Micropiles: <ul style="list-style-type: none"> <li>» Bond zone below deleterious interval</li> <li>» Load tests to reduce bond length</li> </ul>
<b>Coal seams (intact, mined, or at the top of rock)</b>	<ul style="list-style-type: none"> <li>» Review mine mapping/coal reports</li> <li>» Geophysical survey</li> <li>» Additional borings</li> </ul>	Spread footing on rock: <ul style="list-style-type: none"> <li>» Deterioration of coal under footing</li> <li>» Substructure movement</li> <li>» Inadequate bearing resistance</li> <li>» Mine void / collapse under footing</li> </ul> End-bearing piles: <ul style="list-style-type: none"> <li>» Pile relaxation</li> <li>» Substructure movement</li> <li>» Mine void / collapse under piles</li> </ul> Micropiles: <ul style="list-style-type: none"> <li>» Longer bond zone length required to neglect intact coal or collapse zone intervals</li> </ul>	Spread footing on rock: <ul style="list-style-type: none"> <li>» Over-excavate to stable bearing</li> <li>» Backfill w/ Class C conc. or coarse agg.</li> <li>» Deep-mine grouting</li> </ul> End-bearing piles: <ul style="list-style-type: none"> <li>» Pre-drill to stable bearing</li> <li>» Over-excavate coal and backfill</li> <li>» Deep-mine grouting</li> </ul> Micropiles: <ul style="list-style-type: none"> <li>» Bond zone below deleterious interval</li> <li>» Deep-mine grouting</li> <li>» Bond zone below coal or collapse zone</li> <li>» Load tests to reduce bond length</li> </ul>



**IN-DEPTH ANALYSIS TO FIND THE BEST STRUCTURE TYPE FOR EACH BRIDGE**

PWKP visited each bridge, reviewed all provided documents, assessed risks and site characteristics, and estimated costs for each standard design. PWKP assessed cost of each bridge, considering superstructure depth versus available under clearance along with acceptability of profile modifications, skew, schedule, and other criteria.

### Preliminary Schematic Design and Construction

Based on the available information and design criteria, PWKP determined that approximately 75% of bridges included in this project fall into the 30 ft. to 120 ft. total length range and will be simple spans. Approximately 20% of the structures will be less than 30 ft. long and will be constructed as concrete box culverts. The remaining 5% will be constructed as two-span bridges, as shown in **Figure 4.7-2**. Where feasible, entire bridges or portions of bridges will be constructed with basic materials, conventional details and construction techniques that are commonly used on typical PennDOT bridge replacement projects.

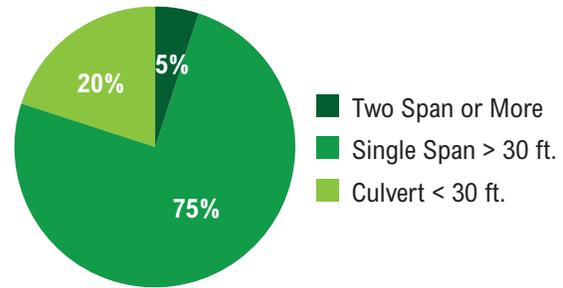
Each bridge type has been thoroughly evaluated during the proposal phase and will be used to provide the most appropriate span length and structure depth to satisfy site conditions and hydraulic requirements.

PWKP may use a combination of integral and non-integral abutments at a given bridge site to ensure an efficient structure that can be constructed with minimal intrusion into the stream and reduced risk to the construction schedule and future maintenance considerations. At all locations, PWKP will accommodate thermal movements of the bridge with standard PennDOT details as modified by approved ATCs. Proposed substructure types are summarized in **Figure 4.7-3**.

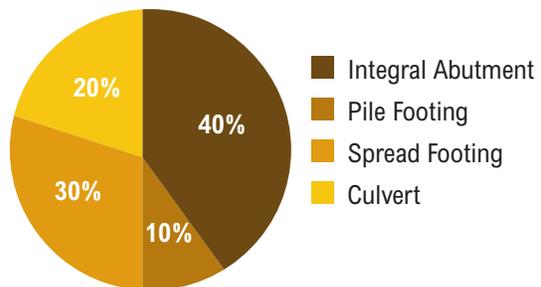
Simple-span bridges are anticipated at most sites. Aspects of the design and construction for simple-span bridges are presented in the following sections including:

- » Construction sequence
- » Geotechnical
- » Plans and design
- » Drainage

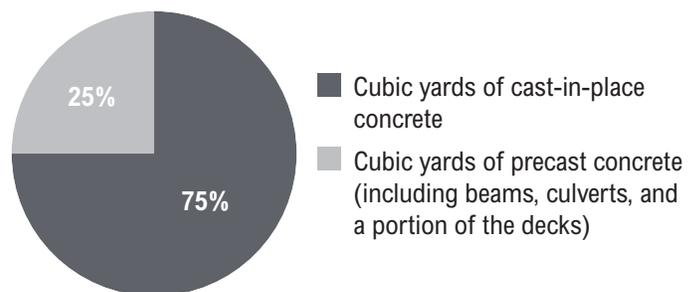
**FIGURE 4.7-2 REPLACEMENT STRUCTURE PROFILE**



**FIGURE 4.7-3 SUBSTRUCTURE TYPES**



**FIGURE 4.7-4 BRIDGE CONCRETE ELEMENTS**



Design and construction considerations for many of the bridges are similar. Therefore, PWKP identified a typical construction sequence that would apply to the vast majority of bridges on the project. For lesser used bridges, primarily concrete bulb-tees and steel plate girder spans, special considerations are included in the construction sequence description that follows.

 In an effort to minimize public impacts and enhance the quality of bridge elements, PWKP evaluated precast elements. The precast elements summarized in **Figure 4.7-4** will be cast offline to avoid traffic impacts and be manufactured in a controlled environment, providing increased quality.

**TABLE 4.7-3 PWKP'S APPROACH TO CONSTRUCTION SEQUENCE**

CONSTRUCTION ACTIVITY	SEQUENCE	CULVERT*	ADJACENT BOX BEAM	SPREAD BOX BEAM	BULB-TEE BEAM	STEEL GIRDER	
Initiate Traffic Control		✓	✓	✓	✓	✓	
Implement E&S Measures		✓	✓	✓	✓	✓	
Demolition of Existing Bridge		✓	✓	✓	✓	✓	
Excavation for Abutment Footing or Culvert Bottom Slab		✓	✓	✓	✓	✓	
Pile Driving or Micropile Installation			✓	✓	✓	✓	
Installation of Base Material		✓					
Abutment Construction			✓	✓	✓	✓	
Installation of Culvert Bottom Slab, Walls, and Top Slab (CIP or Precast)		✓					
Install Bearings or Temporary Supports for Non-Integral Abutments				✓	✓	✓	✓
Install Superstructure Beams or Girders				✓	✓	✓	✓
Form and Place Deck Concrete or Install Precast Deck Panels				✓	✓	✓	✓
Backfill Culvert or Abutment		✓	✓	✓	✓	✓	✓
Install Barriers/Rail		✓	✓	✓	✓	✓	✓
Construct Roadway		FINISH	✓	✓	✓	✓	✓

\*Demolition / construction may include stream diversion

**SEQUENCING**

Table 4.7-3 highlights key activities for each bridge type. For steel girder bridges, PWKP anticipates erecting girders in pairs with steel crossframes/diaphragms installed to provide stability. Concrete bulb-tee beams will be erected as single pieces due to heavier picking weight and be braced as necessary between beams to provide stability.

**MULTI-SPAN BRIDGES**

PWKP identified multi-span bridges as the most appropriate structure type for many locations. Stream access to construct piers is a critical challenge. PWKP recognizes the need to minimize in-water work and has incorporated these considerations into the design of multi-span bridges. PWKP will use temporary causeways, cofferdams, stream diversions, or low-water crossings when necessary.

Piers will generally consist of CIP concrete columns and capbeams in accordance with PennDOT standards and follow this pier construction sequence:

- » Build causeway for access, if not already in place for demolition.
- » Install piles or micropiles (if recommended).
- » Construct footing (pile or spread footing).
- » Construct CIP columns and capbeams.
- » Install neoprene bearings.
- » Construct superstructure and deck based on simple-span bridge sequence described above.

The distribution of bridge construction schedule durations is depicted in **Figure 4.7-5**.

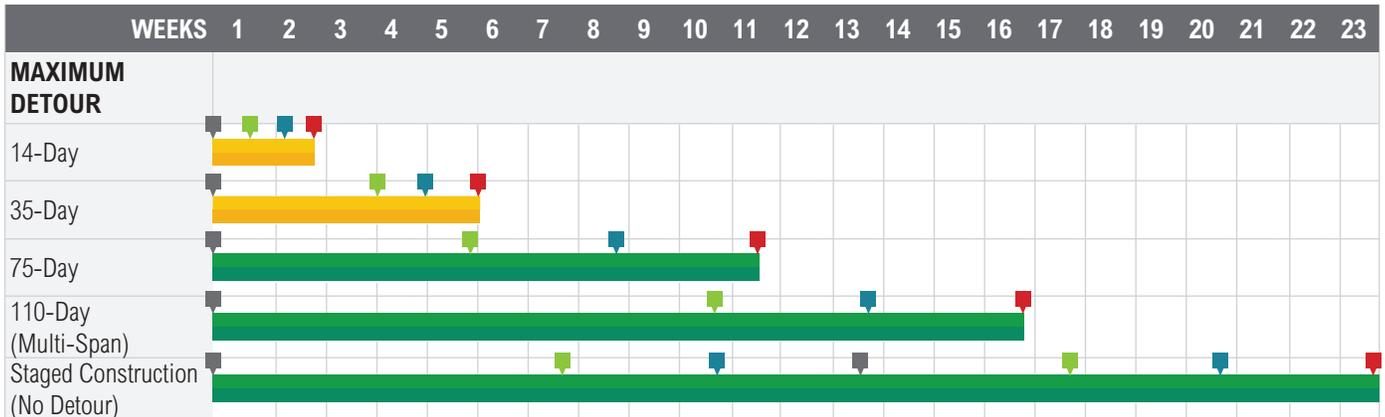
**STAGED CONSTRUCTION**

PWKP anticipates the use of staging for 33% of the bridges on this project. These locations include sites where a suitable detour is not available or convenient for the public, and areas with sufficient bridge width, adequate approach roadway geometry, and sufficiently low traffic volumes to permit safe construction.

Staged construction typically consists of shifting traffic as necessary to remove part of the existing bridge,

**FIGURE 4.7-5 RAPID BRIDGE CONSTRUCTION SEQUENCING BY MAXIMUM DETOUR DURATIONS**

PWKP tailored designs to meet PennDOT’s detour parameters and maximize contract efficiencies.



**LEGEND**

- ABC Methods
- Conventional Method
- Start Detour or Traffic Switch
- Complete Demolition and Substructure Phase
- Complete Deck Construction
- Open to Traffic

construct a portion of the new bridge, and then shift traffic again to construct the remainder of the bridge.

PWKP will develop a TCP for staged construction sites to ensure safe travel throughout construction. PWKP will work closely with PennDOT to coordinate construction schedules and provide advance notice to the public regarding construction staging operations.

**ACCELERATED CONSTRUCTION**

The primary design consideration at each site, as well as the critical path, is the bridge structure. PWKP considered simplified details to expedite bridge construction, such as advanced pile installation, prefabricated elements, and simplified components

such as traffic barriers, expansion joints and approach slab details.

PWKP identified a number of bridges that are ideally suited for accelerated bridge construction (ABC) in order to meet the 14-day and 35-day construction schedule requirements. PWKP anticipates using a combination of precast concrete components, including abutments, wingwalls, and precast decks at these locations. In order to reduce the number of construction joints between these components, PWKP identified several methods to reduce the weight of these elements without compromising strength or durability. PWKP carefully considered the availability of the necessary equipment and its lifting capacity in its design.

**SCHEDULING & SEQUENCING TO MINIMIZE IMPACTS**

- + Typical Construction Season Detour – conventional construction methods – adjacent detour route available
- + Out of School Detour - conventional construction methods with some elements accelerated – adjacent detour route available
- + 5 week Detour – accelerated construction methods and minimized impacts to traffic
- + 2 week Detour – hyper accelerated construction and least impacts to traffic
- + Staged Construction – longer construction and traffic impact but no detours

ABC is relatively new in Pennsylvania; therefore, some of the systems, details and methods that might be employed are not fully addressed in the PennDOT design and construction standards. Thus, many of PWKP’s ATC proposals were related to ABC. These ATCs were based on experience with similar ABC designs, details, construction practices and performance nationwide.

PWKP identified many ABC components successfully used on past projects, and customized these details to make them more efficient or economical to construct while maintaining or enhancing durability. Durability of precast components used in ABC is a critical consideration, particularly in the design and construction of joints between bridge components.

**PWKP IS EAGER TO IMPLEMENT PROVEN AND STATE-OF-THE-ART ABC METHODS IN PENNSYLVANIA**



Riverdale Road CMGC, UT



I-95 Reconstruction, VA



Montour Run Bridge #6, PA

PWKP incorporated the use of optimum materials, including grouts, ultra-high performance concrete, and post-tensioning.

For bridges where traffic requirements dictate a maximum of two or five week detours, PWKP will consider ABC to reduce construction time. ABC techniques are typically more costly; therefore, they will be used only where necessary to balance PennDOT’s goals of expediting construction and minimizing public impacts.

PWKP evaluated the proposed construction against anticipated traffic impacts, requiring full detours, to optimize construction costs in light of impacts to traffic. **Figure 4.7-5** shows PWKP’s sequencing approach by traffic control method. PWKP designed each bridge

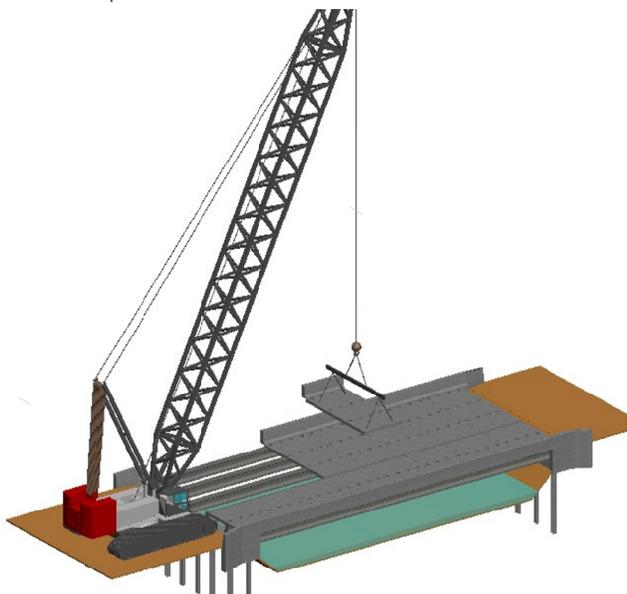
in accordance with anticipated traffic patterns. This analysis showed that the incorporation of more efficient design and construction technology, including use of phased conventional construction and ABC, reduced the number of total detour days without significantly increasing construction costs - a win-win outcome for PennDOT and the public.

PWKP identified many structures that will use ABC, including the deck construction method shown in **Figure 4.7-6**, with the remaining structures using conventional / staged-conventional construction.

ABC methods considered for this project include pre-fabricated elements such as:

- » Precast substructure elements
- » Shop-cast deck on box beams with UHPC closure pours in the field
- » Precast deck panels
- » Precast barriers or metal railings

**FIGURE 4.7-6 DECK CONSTRUCTION USING ABC**  
ABC can optimize detour times and minimize public impacts



**STAGED TRAFFIC CONSTRUCTION:** Bridge #32153 in Susquehanna County will be constructed under staged traffic using integral abutments to avoid impacts to water.



**DRAINAGE SOLUTIONS:** Bridge #5883 in PennDOT District 9-0 in Blair County, SR 4031 over Decker Run, has drainage features.



### Bridge Drainage System

Drainage system decisions will depend on the bridge length. Any required scuppers will follow PennDOT standard details. Drainage collection systems will be used only as needed to maintain water quality below the structure, thus minimizing maintenance.

Where conflicts exist between the existing drainage system and the proposed structure drainage, PWKP will use the approach illustrated in **Figure 4.7-7**.

PWKP will redirect storm sewers around the proposed abutment wingwall to a ditch that runs around the existing wingwall and to the stream.

## ROADWAY ELEMENTS

Roadway elements will be designed in accordance with Attachment 10-1, Geometric Design Information Table, as well as listed standards. PWKP’s overall approach to roadway design, construction, and maintenance will reduce impacts on stakeholders, and minimize cost, as described in the following sections.

**TABLE 4.7-4 VALUE-ADDED ROADWAY ELEMENTS**

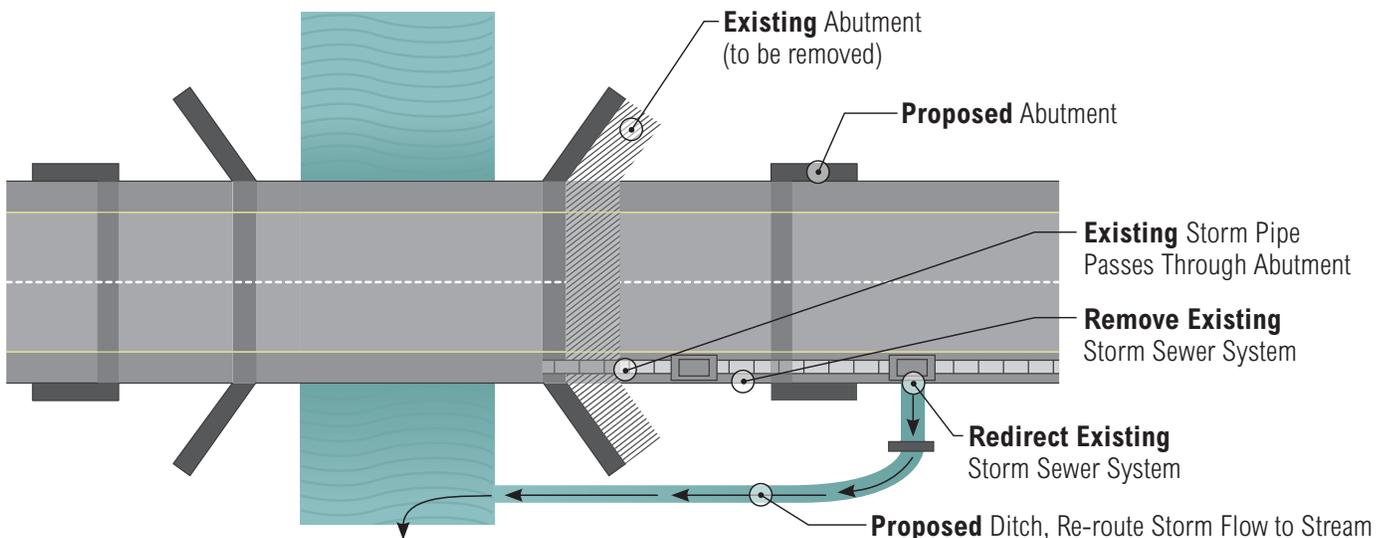
VALUE-ADDED ROADWAY ELEMENT	BENEFIT TO PENNDOT
Standard embankment details	Provides standard designs and materials for construction. Limits geotech investigations and design analyses costs
Long-post rail to eliminate 2-ft. berm outside guide rail	Minimizes embankment material and ROW impacts

### Staging & Traffic Control and Sequencing

PWKP has identified five standard traffic control scenarios for this Project:

- » Full closure with detour
- » Staged construction with alternating one-way traffic directed by stop signs
- » Staged construction with alternating one-way traffic directed by signalization
- » Staged construction with two-way, continuously flowing traffic
- » Temporary road “runaround” using a temporary bridge structure or stream crossing

**FIGURE 4.7-7 PWKP’S APPROACH TO REDIRECTING DRAINAGE**



Each scenario could be applied to any of the bridge design types listed on Form L2.

Each scenario contains standard components for both the temporary and permanent configuration, such as barrier, guiderail, signage, striping, signalization, delineation, drainage, raised pavement markers, rumble strips, and paving.

Staging sequence will be determined by site conditions and specific factors such as existing roadway alignment, sight distance problems, constructability concerns, condition of portions of the existing bridge, and stream diversion requirements.

Design for temporary runarounds will be site-specific and determined by the same factors used to develop staging sequence, as well as ROW, permitting, clearing, and presence of wetlands.

### **ACCESS TO BUSINESSES AND RESIDENCES**

TCPs will include a unique plan for each driveway within the project limits, with special consideration for business access and publicly used driveways.

PWKP will use temporary measures such as rerouting, signage, signalization, barrier, guiderail, striping, channelization, stream crossings, and alternate parking to minimize disruptions.

Bridge designs will never require permanent driveway rerouting unless a written agreement with the driveway owner is in-place. Driveways will be returned to a condition that is equal or better to their condition prior to construction.

PWKP may design new elements, such as barrier, guiderail, signage, or paving, to unobtrusively tie into the permanent driveway.



### **MAINTAINING ACCESS TO DRIVEWAYS AND BUSINESSES**

- ✚ Meet with each property owner and continuously communicate with them
- ✚ Maintain existing or adequate access
- ✚ Driveways will be adjusted as necessary to meet both new roadway conditions as well as temporary access
- ✚ Temporary shoring, barricades, and channelizers will all be used as conditions dictate

### **SCHEDULE AND SEQUENCE OF CONSTRUCTION TO MINIMIZE IMPACTS**



Bridge replacements will be scheduled and sequenced to minimize impacts to the area surrounding the bridge. PWKP's use of integral abutments, pier elimination, and box culverts will minimize environmental disturbances by avoiding waterways and accelerating bridge replacements. PWKP's cost-effective sequencing will reduce impacts to environmentally sensitive areas and local communities, using measures such as reducing the need for access roads, minimizing noisy work at night, controlling dust, using compact staging areas, and designating parking areas at each site. PWKP will monitor traffic queues, adjust signal timing, use off-peak hour traffic shifts, conduct detour signage checks, control dust, and alleviate ponding water issues, when needed, to reduce impacts to traffic.

### **COORDINATION WITH THE DEPARTMENT AND LOCAL TRANSPORTATION AGENCIES**

PWKP will coordinate with PennDOT and local agencies to develop site-specific TCPs and develop solutions for site constraints, such as the restrictions listed in TP Attachment 10-1. TCPs will adhere to PennDOT practices, meet the needs of affected local agencies, and allow for the most efficient construction possible. PWKP will involve PennDOT in the TWG process to effectively coordinate TCP development. PWKP will use questionnaires during the design phase to obtain information from local governments, and plans to have regular discussions with local agencies and design planning meetings for more complicated issues. PWKP will coordinate both of the required local meetings with pertinent agencies, and ensure that coordination details required for design are resolved prior to the meetings.

### **Roadway Geotechnical-Related Issues**

Based on approved ATC #1 (Standard Slope Widening Details), new approach embankments less than 15 ft. in height will be widened in accordance with the details shown in the ATC. As further stipulated in the ATC, additional borings and stability analyses will not be required in these areas. PWKP will inspect the toe bench areas in these embankments for foundation stability prior to embankment construction.



For new embankments in excess of 15 ft., PWKP will perform additional borings during the design phase and perform laboratory testing to provide soil strength parameters for performing stability analyses in accordance with Section 8 of the Technical Provisions. The Standard Slope Widening Details in the approved ATC will be used in these areas as well, with analyses performed to show that stability requirements are satisfied. The results of these analyses will be presented to PennDOT in accordance with the submission requirements specified in Sections 8 and 12 of the Technical Provisions.

For both embankment widening conditions, PWKP will investigate the presence of swelling/expansive soil and rock types. A remediation method for embankment construction will likely include over-excavation or sealing the deleterious materials. PWKP will select a treatment method during design, based on the types and extent of the materials present.

## Maintaining & Protecting Project ROW and Adjacent Roads and Properties

An open line of communication will be maintained with all stakeholders, particularly with adjacent property owners. ROW will be clearly staked by surveyors to ensure that E&S and fence are properly placed. Typical concerns of adjacent property owners are dust, noise, vibration and reduced access. Some adjacent properties will require delineation beyond E&S or survey stakes, and temporary fence will be an option. Small bridge construction is not typically dust prone, but water and palliatives will be used if needed.

Noise and vibration will be a particular concern during pile driving and compaction. PWKP will use vibration

### RELEVANT PENNSYLVANIA SEQUENCING EXPERIENCE:

As a result of previous PennDOT bridge replacement projects on rural roads, such as SR 390 over Leavitt Branch Creek in District 4-0, PWKP understands sequencing construction to minimize impacts to the local community.



## MITIGATING AND MINIMIZING LOCAL ROAD DAMAGE

- Pre-construction inspection (video)
- Maintenance of adjacent properties
- Temporary fencing
- Delineators
- Rock entrances

monitoring, if necessary, for nearby buildings. In areas where noise is a potential concern, PWKP will schedule activities to minimize disturbance. During necessary night work, temporary lighting will be directed towards the work areas inside the ROW.

## Preliminary and Indicative Roadway Schematic

PWKP's preliminary roadway schematic is provided in Volume 2: Appendix. Highlights of PWKP's approach to roadway design follow.

## PAVEMENT AND SLOPE DESIGN

Roadway approach limits will be determined by transitioning the new replacement bridge to the existing approach conditions using transitions as prescribed by current design criteria. These limits will generally be governed by profile adjustments, lane and shoulder width transitions, and/or cross-slope adjustments.

Existing approach pavement will typically be left in place. As such, profile adjustments will use bituminous overlay. Full-depth pavement sections required to accommodate lane widening will match the adjacent pavement section. Shoulder widening will be implemented at a rate of 1/3 design speed-to-one and will be same full-depth pavement section present within travel lanes. Pavement base drain with outlets will be placed under new shoulder pavement section to ensure appropriate subsurface drainage. Existing pavement to remain within project limits will be prepared for overlay with tack coat. Overlay will consist of a minimum 1.5-in. wearing course, with variable depth binder to accommodate any profile adjustments needed. Curb and sidewalk will be reconstructed, as needed, to the limits of roadway approach pavement work.

PWKP will generally use conventional 2:1 embankment fill slopes unless site constraints warrant a steeper slope. To minimize extent to which fill slopes must

be impacted/widened, PWKP is proposing the use of long-post guide rail in lieu of providing a minimum of two ft. of berm behind guide rail as prescribed by current DM2 criteria.

### EXISTING ROADWAY & STRUCTURES

For each bridge replacement, plans will clearly show the disposition of the existing bridge and the limits of existing approach pavement to be replaced, widened and overlaid. If a section of roadway is to be closed to through-traffic, appropriate detour signing will be included in the plans.

### GENERAL PROJECT ROADWAY INFORMATION

Each bridge design package will include general project information such as project limits, design speeds, functional classifications, and traffic data. This information will typically be included on the title sheet or individual plan sheets if bridge packages are bundled.

### Approach to Drainage

PWKP has identified bridges with existing drainage features. Existing drainage systems that outlet through abutment walls and wingwalls will be replaced and directed into new drainage systems at the approach slabs. New drainage systems will be installed at bridges with curbed approaches to capture stormwater upstream of the approaches. The construction of the drainage facilities will be coordinated with traffic control and bridge construction phasing.



#### MITIGATING AND MINIMIZING EROSION AND SEDIMENTATION CONTROL

- + Temporary stream diversion pipe(s)
- + Compost filter sock traps to minimize excavation
- + Delineate environmentally sensitive areas with protective fencing
- + Repair/restore riparian buffer zone with seeding, shrubs, and/or trees
- + Add SWM BMPs to proposed toe of fill ditches to promote infiltration
- + When appropriate, steepen fill slopes to minimize roadway footprint
- + Minimize shoulder width where possible

## CONSTRUCTION LOGISTICS & SUPPLY CHAIN MANAGEMENT

### Coordinating Activities Between the DE and DE Related Entities Execution

Due to the multi-asset, multi-location nature of the project, PWKP's team of geographically diverse exclusive subcontractors will work hand-in-hand with project personnel to efficiently deliver labor, materials, and equipment with minimal impacts to the public. To maintain consistency across all locations, major decisions will be made by PWKP key personnel and implemented regionally.

PWKP will have ultimate accountability for QA and QC, with the CJV controlling large purchase orders. Critical materials like precast elements, steel piles and beams, rebar, and bearings will be procured by the CJV and distributed to subcontractors for incorporation into construction.



For example, the CJV will enter into a project-wide purchase order agreement for all precast components. This allows PWKP to maintain greater control over the fabrication schedule and QC of precast components, and to build contingencies into the overall project schedule, if needed.

### Materials Sourcing and Procurement



PWKP will source and procure materials with the following measures to minimize quality, schedule, and cost risks:

#### Quality

- » Identify all Bulletin 15 approved suppliers for materials
- » Assign a field engineer to oversee plant fabrication for key materials

#### Schedule

- » Identify trucking requirements from production facilities to bridge sites
- » Thoroughly vet production capacities, backlog, and past production history of suppliers

#### Cost

- » Negotiate escalation into Purchase Orders
- » Determine set pricing for all feasible structure concepts to maintain optimum flexibility of design
- » Maximize economies of scale

 PWKP will provide a Logistics Manager to oversee the streamlined procurement and delivery of all CJV provided materials. This individual will be responsible for all documentation, quality, and scheduling concerns associated with materials procurement, including the contingency measures described later.

### Inspection and Testing of Materials at the Source of Supply

 PWKP will inspect and test all materials at the source of supply, deploying CJV personnel for QC, and CQAF personnel for quality acceptance. PWKP’s centralized approach for major components will streamline the inspection, testing, and sampling process. The CQAF, TRC, is the only PennDOT-approved quality firm with testing and inspection experience in the State’s prestressed manufacturing plants.

### Labor, Material, and Equipment Delivery

#### LABOR RESOURCES

Craft labor resources will be deployed by the subcontractor assigned to each individual site. Workers must park within the project limits where possible and will not be permitted to use parking areas that may impact adjacent businesses or property owners.

 Subcontractors will be awarded packages of multiple bridges in close proximity to allow for the efficient allocation of manpower across multiple sites. Such an arrangement will facilitate the retention of trade workers for longer durations than is possible on a single-site contract basis. Increased tenure among workers has been proven to increase safety performance and minimize quality concerns.

#### EQUIPMENT RESOURCES

Subcontractors will provide all necessary equipment. As with labor resources, the bundling of bridge sites will allow subcontractors to maximize utilization of equipment over multiple sites.

PWKP’s key exclusive subcontractors were involved in design development and provided input on the availability of high capacity equipment across each region.

Each bridge site will be evaluated against the project schedule to ensure that the required equipment can

**TABLE 4.7-5 PWKP MATERIAL PROVISION**

CJV SUPPLIED MATERIALS	SUBCONTRACTOR SUPPLIED MATERIALS
<ul style="list-style-type: none"> <li>» Bridge beams</li> <li>» Precast elements</li> <li>» Rebar</li> <li>» Bearings</li> </ul>	<ul style="list-style-type: none"> <li>» Concrete</li> <li>» Aggregate/rock</li> <li>» Formwork and other construction materials</li> <li>» Asphalt</li> </ul>

be mobilized, taking into account all relevant considerations such as other sites currently under detour, posting limits on all roads and bridges, as well as available staging areas at each location.

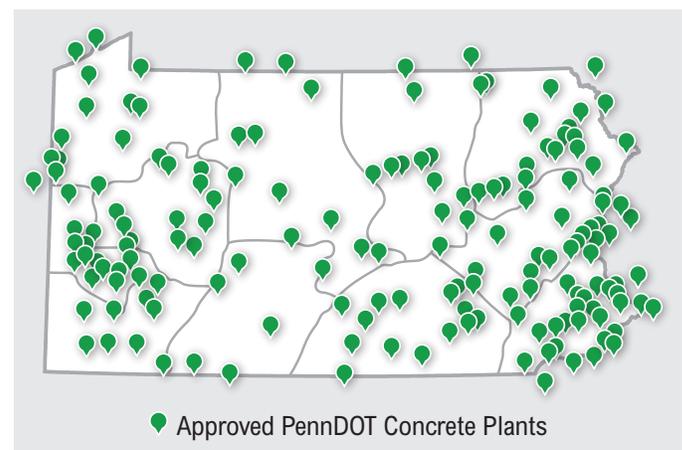
#### MATERIALS RESOURCES

**Table 4.7-5** summarizes material sourcing responsibilities. The CJV will procure materials where economies of scale can be realized, whereas subcontractors will leverage their long-standing relationships with local vendors to supply locally sourced materials.

 Each of PWKP’s exclusive subcontractors maintain staging yards throughout the state which will be utilized to store materials when necessary.

As with equipment deliveries, route surveys will be performed for individual bridge sites to determine feasible delivery options. PWKP’s analysis has shown that only 13% of the bridges on this project are outside of a 25-mile radius of PennDOT-approved concrete supplier plants, which are shown in **Figure 4.7-8**.

**FIGURE 4.7-8 CONCRETE PLANT LOCATIONS**



## Sequencing and Schedule of Fabrication

Material procurement, including individual activities for design, submittals, and delivery, will follow the process outlined in **Figure 4.7-9**, and will be incorporated into the project schedule. PWKP will prepare applicable shop drawings.

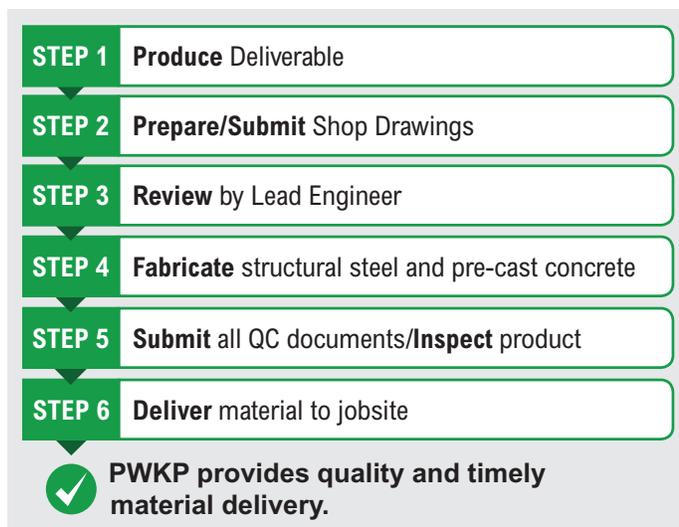
 PWKP's Logistics Manager will maintain a detailed fabrication schedule, integrating the activities of all key suppliers across all bridge sites. Field engineering and QC staff will make regular plant visits to ensure an orderly progression of work, and proper handling, storage, and documentation.

## Ensuring Quality Workmanship

PWKP will ensure quality workmanship by developing ITPs for each production process. Each ITP will include specific hold points for each material produced and will be reviewed and approved by TRC.

During fabrication, TRC and the supplier will work together to implement all requirements of the ITP. TRC staff will serve as an on-site witness at the production facility to perform hold point inspections.

**FIGURE 4.7-9 PWKP'S DESIGN AND PROCUREMENT PROCESS**



## Preventing Encroachment onto Third Party Property

PWKP visited each bridge site and identified clearing requirements and potential adjacent laydown areas, if available, at each location.

PWKP will incorporate approved ROW plans into design documents. ROW plans will be distributed to each subcontractor and reviewed prior to deploying crews to each site. We have identified several locations where excavation is required immediately adjacent to existing structures or driveways. PWKP will use temporary shoring, as appropriate, to prevent or minimize encroachment.

## Coordination with the CQAF

PWKP's QM, Matt Semerad, will be TRC's primary point-of-contact for scheduling and coordination. During the design phase, TRC will analyze PWKP's resource-loaded schedule to plan manpower requirements. PWKP will coordinate with TRC on schedule updates as the project progresses. TRC will be actively involved in the development and approval of all ITPs. Based on the ITPs, Matt and TRC will develop a matrix of plant locations, hold points, witness points, and required documentation.

## Documenting and Reporting Compliance

Each hold point inspection will be documented in the EDMS. All requirements for documentation will be detailed in the approved ITP. If any materials are found to be non-compliant, PWKP will generate and track an NCR. After corrective action is successfully completed, documentation will be provided to demonstrate that the final product is in conformance.

## Corrective and Preventative Action Processes

PWKP will issue NCRs for any non-conforming elements encountered in the production process. PWKP will work with the supplier to develop a plan for corrective action, which must be approved by TRC. The supplier will then implement the corrective action procedures.

In order to prevent future non-compliance issues and promote continuous improvement, PWKP will make

appropriate changes to ITPs, implement additional hold points, or use different inspection techniques.

### Incorporation of Audit Findings

PWKP’s QAM will be responsible for performing all quality audits and transmitting all audit findings to the DE’s management personnel. PWKP’s QC staff will analyze audits to determine the root cause of any non-conformance issues and to improve ITPs and SOPs.

### Contingency Plans

PWKP will develop contingency plans prior to the start of construction detailing the procedures to be used in the event that work must stop or not commence at a particular site and resources must be reallocated to an alternate location.



Bridges will be grouped into bundles based on considerations like geography, traffic control, and foundation type. For each bridge, an alternate site or sites, drawn from the like grouping, will be identified prior to the commencement of construction, and PWKP will ensure that design, permitting, and procurement have progressed sufficiently to relocate construction activities to the alternate site with minimal expediting requirements.

If work, whether design or construction, is suspended or delayed at a particular site, immediate design, quality, and safety hold points will be implemented to identify and address all concerns associated with the unforeseen condition, as shown in **Table 4.7-6**.

**TABLE 4.7-6 HOLD POINT ANALYSIS AND ACTIVITIES**

PRIMARY BRIDGE SITE	ALTERNATE BRIDGE SITE
Develop and implement plan to secure site	Implement expediting process for pre-construction activities
Prepare and disseminate public communications regarding changed conditions	Prepare and disseminate public communications regarding schedule acceleration
Identify and survey unforeseen conditions encountered	Review site-specific safety plan to identify impacts of acceleration measures
Update project and regional three-week schedule to account for changes	Update project and regional three-week schedule to account for the changes

## ROW PLAN DEVELOPMENT

### Developing Project ROW Plans

PWKP will use the process outlined in **Figure 4.7-10** to develop ROW plans.

PWKP will ensure that all proposed design features, including those required for geotechnical benching and storm water management appurtenances are considered, and that sufficient required ROW or easement areas are acquired. Proposed easement and required ROW lines will be reflected on preliminary ROW plan. Plans will also indicate what permanent or temporary feature is driving the need for the takes and easements indicated.

**FIGURE 4.7-10 PWKP’S PROCESS FOR ROW PLAN DEVELOPMENT**

- 1 Identify** bridge sites where ROW acquisition may be subject to complication
  - 2 Develop** logical sequence of ROW plan preparation
  - 3 Research** deed information through courthouse/websites offering online access to existing property owner information
  - 4 Develop** property mosaic
  - 5 Develop** property and legal ROW using a best fit of the record ROW geometry from tax maps, existing ROW plans, and property boundary information
  - 6 Re-establish** existing ROW baseline using DFV-based plan, profile, and typical section information
  - 7 Identify** anticipated permits; partial and total takes; and utility drainage/temporary construction easements to accommodate construction activities
  - 8 Submit** to PennDOT for review, comment, and approval
  - 9 Incorporate** PennDOT’s comments and prepare final ROW plans (PWKP)
  - 10 Approve** final plans (PennDOT)
  - 11 Begin** appraisal and acquisition process (PennDOT’s ROW acquisition firm)
- PWKP’s process will help PennDOT in achieving ROW procurement milestones.**

**RELEVANT ROW EXPERIENCE:** PWKP has extensive experience designing PennDOT bridges in areas with similar ROW considerations to those on this project, such as District 12-0's Arona Road Bridge.



Delivery of final ROW plan sets will not exceed 40 per month as prescribed in proposal documents.

PWKP will provide a Board of View plan for any property for which the proposed acquisition and payment thereof is challenged by property owner through the legal system. Additionally, PWKP is committed to provide expert witness testimony if so directed by Department Office of Chief Counsel. PWKP will maintain a database that tracks the progress of all ROW acquisitions and associated concerns.

### Minimizing Impacts to ROW

PWKP anticipates minimizing ROW impacts and reducing the Temporary Construction Easement (TCE) requirements by selecting the appropriate bridge type and construction methods. By evaluating the effects of design on ROW, and working through the construction means and methods, PWKP has combined the best ideas to reduce ROW impacts as much as feasible.



#### OPTIONS TO MINIMIZE ROW IMPACTS

- + Replace bridges within the existing alignment
- + Minimize abutment heights to reduce excavation/demolition and, in turn, construction footprint
- + Use U-wing abutments to minimize roadway construction and ROW
- + Standardize slope designs to allow steeper slopes and reduce footprint of approaches
- + Eliminate piers, where possible, to reduce TCE
- + Use appropriately sized cranes and equipment to complete activity within existing ROW

## UTILITY RELOCATION AND ADJUSTMENT WORK ELEMENTS

### Utility Work Performance

PWKP has assembled a Utility Management Program (UMP) led by Abdoul Diallo, Utility Manager (UM), and an experienced utility coordination team. As manager of the UMP's staff across Pennsylvania, Abdoul will be the primary project liaison between PennDOT, subcontractors, and third party utility owners, and will ensure that all relocation work is performed safely, with the highest quality, and in accordance with the project specifications. Abdoul will be supported by HDR's utility division, and Utility Design Coordinator (UDC), who will assist in monitoring utility relocation designs, ROW plans, and utility agreement packages. PWKP's UMP team has strong working relationships with utility companies across the State.

Immediately following NTP 1, the UMP Team will use its preliminary schedule to coordinate the execution of the remaining utility relocations, manage coordinated work operations and the construction of incorporated utility adjustments for the Early Completion Bridges. For the Remaining Eligible Bridges, the UMP Team will use a combination of verification methods to confirm the utility conflicts obtained during the proposal, will administer the utility adjustment engineering process, and assure that all procedures meet the requirements of DM-5.

The UMP Team will take responsibility for efficiently conducting key verification methods, including:



#### PWKP'S UTILITY MANAGEMENT TEAM

- + UM has over seven years of experience managing projects with major utility relocations, including the relocation of a 93-in. water main and a 10.5-ft. square box sewer on PennDOT's largest construction contract to date: the I-95 Section CP2 Reconstruction Project.
- + UDC will have extensive experience in relocations, PennDOT utility program oversight, and coordination with utility owners throughout the State.
- + HDR's UMP Team offers a national staff with uniform utility best practices, and a strong track record in avoiding contractor delays due to utility conflicts. and issues.

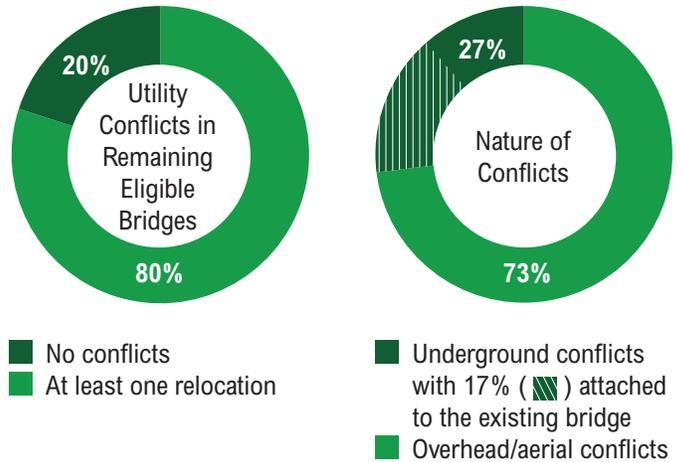
- » Performing PA One-Calls
- » Early coordination with utility owners
- » Verifying PennDOT-provided utility information with the UMP team’s preliminary site investigations
- » Researching and obtaining existing permits & real property interest documents
- » Surveying and plotting visible above-ground features and correlating information with as-builts
- » Exposing utilities, as needed, through a coordinated Subsurface Utility Engineering (SUE) program to ascertain horizontal and vertical locations
- » Provide and track authorizations and notices to utility owners
- » Provide adequate advanced notice to PennDOT when permits or ROW must be obtained
- » Provide PennDOT with adequate information to assist in determining the potential for cost sharing
- » Coordinate with utility owners to facilitate the design and construction of the utility adjustments

The UMP team will promptly notify PennDOT and utility owners of unidentified or new utilities discovered during investigations.

### Coordination and Scheduling of Utility Adjustments

From their extensive utility coordination and engineering experience, the UMP Team understands the high level of coordination required with PennDOT,

**FIGURE 4.7-12 UTILITY CONFLICTS**



utility owners, subcontractors, and other stakeholders, to meet the schedule demands of these 558 bridges.

 Using the information provided by PennDOT, supplemented by individual bridge inspections for all 558 bridges, PWKP generated a preliminary utility conflict matrix. This matrix provided a foundation for scheduling utility adjustment timelines based on an estimated number of utilities and utility owners that may be involved at each bridge location. A snapshot of the matrix is shown in **Figure 4.7-11**, and the document is included in its entirety in Volume 2: Appendix. Utility conflicts are summarized in **Figure 4.7-12**.

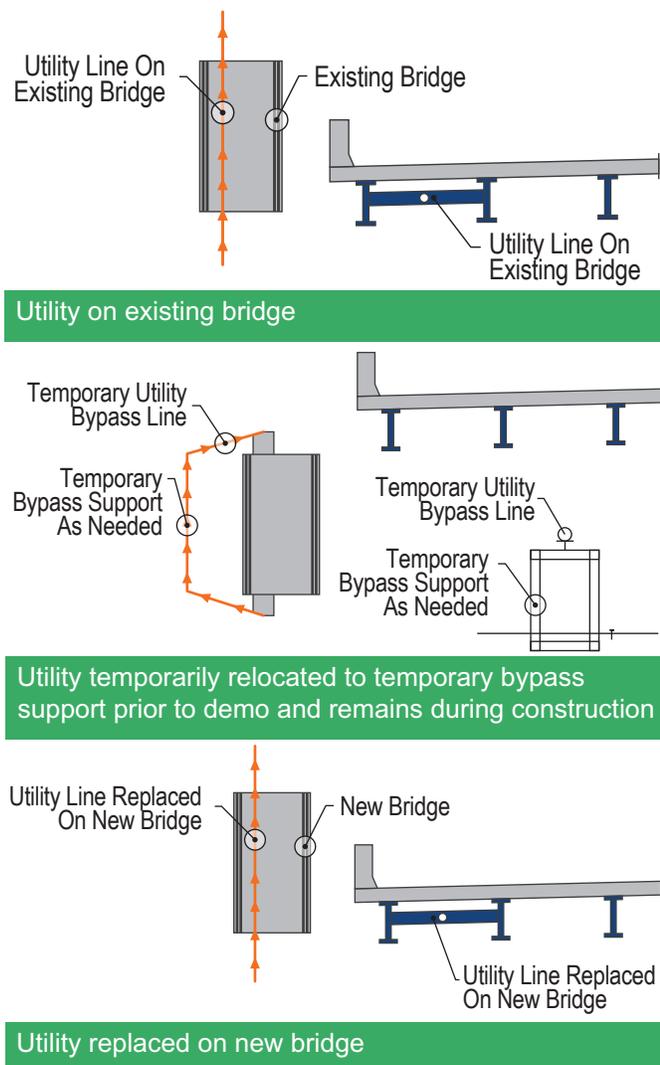
Locations that have the same utility companies present will be grouped and relocations sequenced to establish a consistent work flow for those utility

**FIGURE 4.7-11 SNAPSHOT OF SINGLE LOCATION IN PWKP’S MASTER UTILITY CONFLICT MATRIX**

UTILITY CONFLICT MATRIX																			
BRIDGE KEY	DISTRICT	COUNTY	FEATURE INTERSECTED	# RELOCATE UNDERGROUND						STRUCTURE ATTACHED (TYPE - I.E. WATERLINE)	# RELOCATE AERIAL								
				WATER	SANITARY	GAS	OIL	FIBER OPTIC	ELECTRIC		UNSPECIFIED	ELECTRIC (EACH)	TELEPHONE	TV	FIBER OPTIC	CONFLICTS	POLE CONFLICTS	POLE GRAND TOTAL CONFLICTS	UTILITY OWNERS PER POLE
21277	08	LANCASTER	LITTLE CONESTOGA CREEK	2	1	0	0	6	0	0	2 EA-8" WATER, 6EA-4" FIBER OPTIC	3	3	2	2	9	3	12	4
1373	11	ALLEGHENY	BAILEYS RUN	1	0	1	0	0	0	0	12" WATER, 12" GAS	6	4	4	0	3	4	7	3

companies. PWKP's established and efficient working relationships with PA utility owners will help maintain schedule. Relocations that can be performed before construction begins will alleviate the chance of several subcontractors operations interfering with one another. Much of the utility relocation work will be considered "Restrictive" or "Incorporated", and occur in conjunction with bridge construction. PWKP will strategically schedule work and use innovative methods to minimize potential impacts. When utilities are attached or within close proximity to a bridge and require relocation and maintenance during the demolition and construction phases, it may be feasible to quickly install support structures adjacent to the bridge to carry a temporary bypass line. The approach shown in **Figure 4.7-13** may allow utilities to remain in service.

**FIGURE 4.7-13 MINIMIZING DISRUPTION TO UTILITIES**



 Utility adjustment work schedules will often be discussed with utility owners to make any necessary provisions, to ensure the order of adjustments are being maintained, and to confirm the adjustments are being carried out as efficiently as possible.

## Coordination and Engagement of Utility Owners

Primary goals of PWKP's UMP to engage utility owners and encourage their cooperation include:

- » Promote bridge design and construction alternatives that minimize the need for relocations as well as minimize relocations costs for all utility owners.
- » Minimize impacts to utility customers, the motoring public, and construction activities
- » Early utility mapping and verification to allow utility owners more time for preparing utility relocation engineering and agreement packages
- » Early and constant communication with utility companies on scopes, cost responsibility, & scheduling
- » Review relocation plan sets at the 30% and 90% design stages to assure that DM-5 criteria is met, address conflicts, and follow assigned routes
- » Perform necessary relocations prior to construction, when possible, to minimize schedule impacts
- » Qualify multiple subcontractors to reduce schedule risks due to field adjustments
- » Coordinate and track adjustments in a Utility Tracking Report

PWKP's approach with the utility companies will include early and frequent communication to develop an adjustment design that ensures the safety of the motoring public, minimizes the disruption to utilities, provides the least schedule impact to each bridge, and reduces costs for the utility companies and PennDOT. The team will apply this process at joint meetings between PennDOT, the utility owners, and the PWKP's design engineers, to establish an efficient means for protecting or relocating utilities. The UMP team will make every effort to limit or eliminate the need for utility relocations and ROW acquisitions by implementing feasible modifications to the design plans. The commitment to partner and cooperation from all entities involved with the utility adjustment process will be crucial to minimizing schedule delays.

## CONTEXT SENSITIVE AESTHETIC ELEMENTS

PWKP will provide aesthetic treatments to various bridge elements in accordance with Section 14 of the Technical Provisions and the Context Sensitive Design and Aesthetics Master Plan. PWKP will apply the aesthetic treatments to the various bridge elements in a coordinated manner that establishes a brand for the project while maintaining context-sensitivity.



The Master Plan will dictate a defined level of aesthetic treatment to every bridge on this project. The treatment level will match Attachment 10-1 of the Technical Provisions. Based on aesthetic treatment levels, standard combinations of aesthetics elements will be applied to each bridge.

The levels of aesthetic treatments will include Base, Nominal 1, Nominal 2, combined Nominal 1 and 2, and Enhanced in accordance with Section 14.2.3 of the Technical Provisions. As per Attachment 10-1 of the Technical Provisions, the number of bridges in each category is shown **Table 4.7-7**.

The “Base” aesthetic treatment establishes the unifying “look” or branding for the project and will be applied to all bridges, with higher levels building on it to promote consistency. The brand will be developed by the consistent use of color, materials and elements at consistent locations.

PWKP will perform an aesthetics inventory of all of the replacement bridges in accordance with Section 14.2.2 of the Technical Provisions. PWKP’s inventory form format coordinated with PennDOT to ensure that it contains all necessary information. This inventory, along with the aesthetic treatment level indicated in Attachment 10-1, will determine aesthetic treatment at each bridge. Existing aesthetic treatments will be replaced in accordance with the Master Plan.

**TABLE 4.7-7 AESTHETIC TREATMENT QUANTITIES**

AESTHETIC TREATMENT LEVEL	% OF BRIDGES
Base	87%
Nominal 1	5%
Nominal 2	4%
Combined Nominal 1 and 2	3%
Enhanced	1%

**FIGURE 4.7-14 PWKP’S ENHANCED AESTHETIC TREATMENT**



PWKP will develop aesthetic details for each treatment level. Site-specific applications of these details will be included in the design drawings. PWKP will submit separate site-specific design drawings for any bridge that does not conform to the Master Plan, along with a detailed explanation, including photos of existing conditions, for the variance prior to construction.

PWKP will coordinate the implementation of the aesthetic treatments specified in the Master Plan with the structural and civil designs to ensure that constructability and safety requirements are maintained for each bridge. This will be a continuation of the coordination between aesthetics and structural design that was integral to the development of the Master Plan.

Bridges in historic districts will follow the Master Plan guidelines to identify the historic and local context, to determine how to apply or modify standard aesthetic elements. Aesthetics will be consistent with the Master Plan and Section 4.4.5.9 of the Technical Provisions.

PWKP will work with PennDOT to develop a stamped emblem or cast metal plaque to be incorporated into the design of each replacement bridge. The location and manner in which the stamp or plaque is incorporated will be consistent with the Master Plan, to assure consistent branding of the bridges.



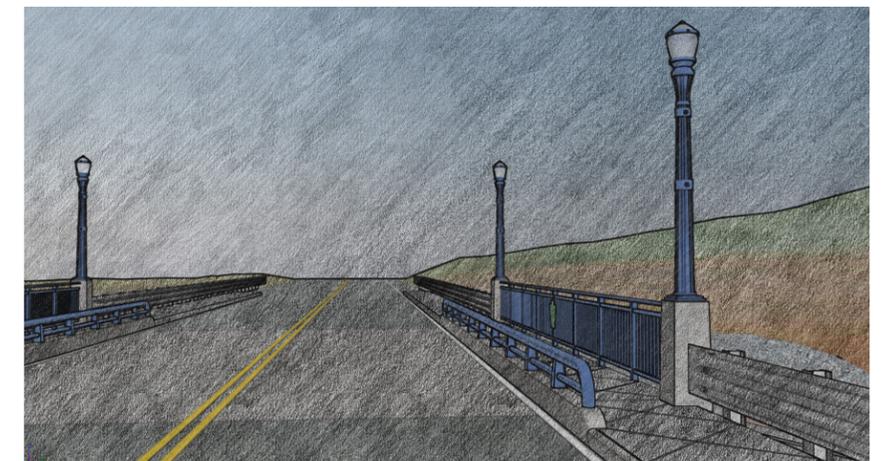
### PWKP’S AESTHETICS DESIGN TEAM

- Similar experience on CDOT’s Eagle P3 in Denver, a 35-mile rail corridor with extensive aesthetics
- In-house architectural staff that can work directly under control of the Lead Engineer, HDR, to assure optimum coordination and efficiency

**FIGURE 4.7-15 PWKP'S BASE AESTHETIC TREATMENT**



**FIGURE 4.7-17 LIGHTING FOR ENHANCED AESTHETIC LEVEL BRIDGES**



**FIGURE 4.7-18 DECORATIVE SIDEWALK SCORING**



**FIGURE 4.7-16 PWKP'S NOMINAL 1 AESTHETIC TREATMENT**



**FIGURE 4.7-19 LANDSCAPING WILL BE PROTECTED WHERE POSSIBLE**



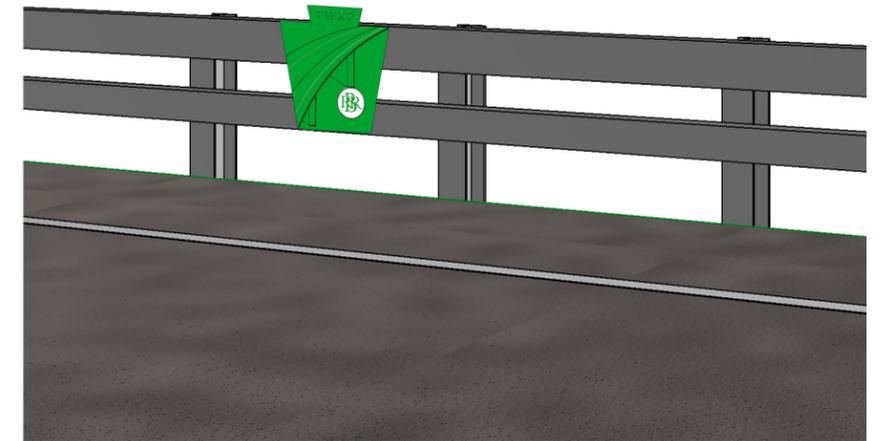
**FIGURE 4.7-20 PWKP'S COMBINED NOMINAL 1 AND 2 TREATMENT**



**FIGURE 4.7-21 PWKP'S ENHANCED AESTHETIC TREATMENT**



**FIGURE 4.7-22 PROPOSED STAMP LOCATION**



**FIGURE 4.7-23 GRAVEL SLOPES AT WING WALL**



**FIGURE 4.7-24 STANDARD PEDESTRIAN RAILING - ALUMINUM PICKET STYLE**





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Proven, Local, Safety and Quality-Driven

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**PENNSYLVANIA BRIDGES**  
Expedited, Sustainable, High-Quality,  
and Cost-Effective