FRA–71–17.76
FRA–670–4.19
PID 77369

PROJECT SCOPE

State of Ohio
Department of Transportation
Jerry Wray, Director

I-70/I-71 South Innerbelt – Project 1
I-71/I-670 Interchange
Design-Build

Revision Date: March 2, 2011
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1 General

1.1 Project Context & Introduction

Project 1 – I-71/I-670 Interchange: This project is the first phase of the group of projects that make up the improvements to the I-70 / I-71 split corridor.

At the south end, this project will be joined by Project 3 – I-71 East Trench. The transition pavement is provided to match the new pavement to the existing pavement, since there will be a grade differential.

Below is a map of the work involved as part of Project 1 – I-71/I-670 Interchange. The full size version of this map is located as Appendix GN-01.
1.2 Project Requirements

The overall goal of the project is to improve the safety and operational efficiency of the I-71 / I-670 interchange. To this effect, the Design-Build Team (DBT) shall:

- Complete the project in 42 months from the date of the executed contract between the DBT and the Department
- Maintain two lanes of traffic in each direction on I-71 in accordance with the OMUCTD and ODOT Standard Construction Drawings at all times, except as permitted in Section 16 – Maintenance of Traffic
- Maintain minimum lane widths of 11’ on freeways and ramps during construction.
- Keep system ramps open at all times except as permitted in Section 16 – Maintenance of Traffic

1.3 Environmental Commitments

The Project shall be in compliance with the following I-70/71 South Innerbelt Documents:

A. Memorandum of Agreement (Appendix EN-01)
B. First Amendment of the Memorandum of Agreement (Appendix EN-01)
C. Environmental Assessment (Appendix EN-02)
D. Section 4(f) Evaluation (Appendix EN-03)
E. Finding of No Significant Impact (Appendix EN-04)
F. Environmental Reevaluation No. 1 for Project 1 (Appendix EN-05)

The Design-Build Designer shall be knowledgeable of the Project’s environmental record and the basis for the Project Decision. The DBT shall design and construct the Project in a manner that does not increase Project documented environmental impacts and does not increase the severity of each impact based on context and intensity individually or in accumulation with other Project impacts.

1.4 Basic Configuration

The Project scope in its entirety along with elements of the Preliminary Engineering Plans, as indicated in this section, constitute the basic configuration. The design-build proposal shall be consistent with the basic configuration subject only to such changes as may have been approved by the Department in accordance with the Alternative Technical Concepts, as described in the Selection Criteria document.

The following elements of the Preliminary Engineering Plans shall be considered as part of the basic configuration:
A. The following elements of the Step 7 Engineering Plans (Appendix RD-03):
   1. Horizontal and vertical alignments, including allowable adjustments as described in Section 10.2.4
   2. Lane widths
   3. Number of lanes
   4. Location and number of interchange ramps
   5. Approximate location of project limits
   6. Design exceptions
   7. Typical sections
B. The following items described in Section 10.2
   1. Updates to the Step 7 Engineering Plans (Section 10.2.2)
   2. Commitments and Comments to Address on the Step 7 Engineering Plans (Section 10.2.3)
   3. Adjustments to the Step 7 Engineering Plans (Section 10.2.4)
   4. Survey Requirements at Tie-in Locations (Section 10.2.5)
C. The environmental commitments contained in the Environmental Assessment/FONSI (July 10, 2009)
D. The Memorandum of Agreement (August 1, 2007), and the First Amendment of the Memorandum of Agreement (July 18, 2008) (Appendix EN-01)
E. Environmental Reevaluation No. 1 for Project 1 (September 2, 2010) (Appendix EN-05)
F. Section 4(f) Evaluation (June 1, 2009) (Appendix EN-03)
G. Right-of-Way Limits as indicated in the Right-of-Way Plans (Appendix RW-01), with the exception that no work shall take place north of the north curb line of Jack Gibbs Boulevard between Sta 56+00 and Sta 71+50.
H. Interchange Modification Study documents, which include:
   1. Interchange Modification Study (revised July 26, 2010) (Appendix RD-01A)
   2. Addendum to the Interchange Modification Study (August 13, 2010) (Appendix RD-01B)
   3. Appendices for the Interchange Modification Study (Appendix RD-02)
I. Approved Design Exception for I-670 Eastbound Superelevation (September 8, 2010) (Appendix RD-10)
J. Contract for Right of Entry with Columbus State Community College (Appendix RW-02)
K. Memorandum of Agreement with Columbus State Community College (Appendix RW-03)
1.5 Conceptual Plans and Reference Documents

The DBT shall be solely responsible for design and construction for this contract in accordance with the Contract Documents and Basic Configuration Documents.

Contract Documents consist of contractual requirements.

Basic Configuration Documents are Contract Documents that contain elements of the Basic Configuration. These Basic Configuration elements shall be considered to be contract requirements.

Reference Documents contained in the RFP (including those portions of the Step 7 Engineering Plans that do not establish the Basic Configuration elements) are provided for informational purposes to assist the Proposers in preparing their Proposals, but the Reference Documents do not represent requirements binding on the Design-Builder. The Department makes no representation or warranty as to the accuracy, adequacy, applicability, or completeness of the Reference Documents. Except to the extent set forth to the contrary in the Contract, reliance upon the Reference Documents shall be at the Proposer’s risk, and the Department shall have no liability or obligation as a result of the inaccuracy, inadequacy, inapplicability, or incompleteness of the Reference Documents, regardless of the contents thereof. Each Proposer is responsible for reviewing the Step 7 Engineering Plans in advance of submitting its Proposal, for purposes of assessing their adequacy for meeting the Contract requirements, and determining whether any changes are necessary or advisable. The Design-Builder shall be solely responsible for Project design and construction in accordance with the Contract.

A listing of Contract Documents, Basic Configuration Documents, and Reference Documents is found in the Appendix Document Inventory, located at the end of this Project Scope document.

Each appendix item has an “Issue Date”. The Issue Date represents the original publication date of the appendix item (by ODOT, City of Columbus, or others).

Contract Documents and Basic Configuration Documents have a “Version Date”. The Version Date represents the most recent Contract Document or Basic Configuration Document. The Version Date has been printed onto the lower-right corner of each page of the Contract Documents and Basic Configuration Documents.

1.6 Project Location and Limits

The project is located north of downtown Columbus, and involves work on I-71, I-670, and several city streets. The project limits are within the construction limits shown in the Step 7 Engineering Plans (Appendix RD-03) and within the provided project right-of-way limits (shown on Appendix RW-01) and are described as follows:

- Work on I-71 extends from Broad Street to I-670 Westbound
- Work on I-670 extends from Cleveland Avenue to Joyce Avenue
- Work on Jack Gibbs Boulevard is between I-670 on/off ramps and Hamilton Ave.
- Work on Cleveland Avenue is between Mount Vernon Ave. and Jack Gibbs Blvd.
- Work on Spring Street is between Jefferson Ave. and Hamilton Ave.
- Work on Long Street is between Jefferson Ave. and Hamilton Ave.
- Work on the southbound urban corridor street is between Long St. and Spring St.
- Work on the northbound urban corridor street is between Long St. and Spring St.
- Work on Leonard Avenue is between St. Clair Ave. and Bolivar St.

## 1.7 Design Designations and Maintaining Agencies

The table below indicates the functional classification, design speeds, legal speeds and maintaining agencies of roadways that are designed and constructed as part of this contract or shall be crossed by a new bridge or other structure as part of this contract. Traffic information, if obtained, is depicted in the Interchange Modification Study. Additional traffic information required shall be obtained by the DBT and must be certified as necessary.

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Design Functional Classification</th>
<th>Design Speed</th>
<th>Legal Speed</th>
<th>Maintaining Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-71</td>
<td>Urban Interstate</td>
<td>60 mph</td>
<td>55 mph</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>I-670 EB</td>
<td>Urban Interstate (see Table 10-4)</td>
<td>60 mph</td>
<td>55 mph</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>I-670 EB</td>
<td>Urban Interstate (see Table 10-4)</td>
<td>65 mph</td>
<td>65 mph</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>I-670 EB</td>
<td>Directional Roadway (see Table 10-4)</td>
<td>55 mph</td>
<td>55 mph</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp V1</td>
<td>Ramp</td>
<td>Varies 30-45 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp V2</td>
<td>Ramp</td>
<td>50 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp V3</td>
<td>Ramp</td>
<td>Varies 40-50 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp V5</td>
<td>Ramp</td>
<td>45 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp V6</td>
<td>Ramp</td>
<td>45 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp W1</td>
<td>Ramp</td>
<td>Varies 30-50 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp W2</td>
<td>Ramp</td>
<td>Varies 40-50 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp W3</td>
<td>Ramp</td>
<td>Varies 30-50 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp W4</td>
<td>Ramp</td>
<td>Varies 25-35 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp W5</td>
<td>Ramp</td>
<td>Varies 25-35 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
</tbody>
</table>
### Roadway Design Functional Classification

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Design Functional Classification</th>
<th>Design Speed</th>
<th>Legal Speed</th>
<th>Maintaining Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp X1</td>
<td>Ramp</td>
<td>Varies 30-50 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp X2</td>
<td>Ramp</td>
<td>Varies 30-45 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp X3</td>
<td>Ramp</td>
<td>Varies 45-50 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp X4</td>
<td>Ramp</td>
<td>Varies 45-55 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp X5</td>
<td>Ramp</td>
<td>Varies 30-45 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Ramp X6</td>
<td>Ramp</td>
<td>45 mph</td>
<td>N/A</td>
<td>Ohio Department of Transportation</td>
</tr>
<tr>
<td>Spring St.</td>
<td>Urban Principal Arterial</td>
<td>40 mph</td>
<td>35 mph</td>
<td>City of Columbus</td>
</tr>
<tr>
<td>Long St.</td>
<td>Urban Minor Arterial</td>
<td>40 mph</td>
<td>35 mph</td>
<td>City of Columbus</td>
</tr>
<tr>
<td>Southbound Urban Collector</td>
<td>Urban Minor Arterial</td>
<td>35 mph</td>
<td>35 mph</td>
<td>City of Columbus</td>
</tr>
<tr>
<td>Northbound Urban Collector</td>
<td>Urban Minor Arterial</td>
<td>35 mph</td>
<td>35 mph</td>
<td>City of Columbus</td>
</tr>
<tr>
<td>Cleveland Ave.</td>
<td>Urban Principal Arterial</td>
<td>40 mph</td>
<td>35 mph</td>
<td>City of Columbus</td>
</tr>
<tr>
<td>Jack Gibbs Blvd.</td>
<td>Urban Collector</td>
<td>35 mph</td>
<td>35 mph</td>
<td>City of Columbus</td>
</tr>
<tr>
<td>Leonard Ave.</td>
<td>Urban Minor Arterial</td>
<td>40 mph</td>
<td>35 mph</td>
<td>City of Columbus</td>
</tr>
<tr>
<td>St. Clair Ave.</td>
<td>Urban Collector</td>
<td>40 mph</td>
<td>35 mph</td>
<td>City of Columbus</td>
</tr>
</tbody>
</table>

### 1.8 Compatibility with Final Build of the I-70/I-71 Project

This contract is one of many construction contracts of a program of projects to reconstruct the I-70 / I-71 Interchange. It is a requirement to minimize any re-work of facilities built in this contract for the construction of future contracts. The engineering plans for Project 3 – I-71 East Trench are made available to the DBT to ensure that their designs meet this requirement.

The DBT should be aware that there is a grade differential and horizontal alignment shift between the existing and new pavements at the south end of the project. Therefore, the DBT shall ensure that transitions are provided per Section 10.3.4.

In addition, the DBT should be aware that there may be horizontal and vertical variations between the urban avenue alignments provided in the Project 3 engineering plans and those provided in the Step 7
Engineering plans (Appendix RD-03). The DBT shall adjust their design to tie into the Project 3 urban avenue alignments and profiles and minimize any re-work, as required by this section.

1.9 Major Plan Submissions to the Department

In addition to the meeting the requirements of Section 2 – Quality Management, The DBT shall submit the plans listed below in draft and final format to the Department for review and comment:

A. Quality Management Plan
B. Public Information Plan
C. Aesthetics and Enhancement Management Plan
D. Conceptual Maintenance of Traffic (MOT) Plan

Review and comment by the Department does not constitute approval of these plans. These plan submissions shall meet the requirements of Section 2 for Independent Quality Firm (IQF) review and approval procedures (unless noted otherwise in the Project Scope).

Additional submittals directly to the Department are required in accordance with the contract and shall be identified in the Quality Management Plan (QMP).

1.10 Project Datum and Survey Control

The project datum and survey control are:

Horizontal Datum: NAD 83 (86) State Plane Coordinate System, Ohio South Zone (3402)
Vertical Datum: NAVD 88, Geoid Model: GEOID 99

Project Conversion:
Project Adjustment Factor (P.A.F.): 1.000043907
Project base point for scale adjustment is Franklin County Monument “FRANK 143”
To convert from grid coordinates to project ground coordinates, scale northings and eastings radially from monument “FRANK 143” (Northing=711726.0754, Easting= 1840542.0310)

Project alignment data information is indicated in the Right-of-Way Plans, which are included as Appendix RW-01.

The initial project base mapping was prepared in 2002 using aerial photography and a photogrammetric mapping. Supplemental project mapping data has been collected by field surveying methods. Survey control was set in 2009; horizontal control values were established by static GPS methods and elevations were established by digital leveling. Survey control data for the project is included as Appendix GN-05.

A revised project Digital Terrain Model (DTM) was prepared for the project in February, 2010 to meet the DTM accuracy requirements of ODOT Mapping Specifications, dated July 17, 2009. The DTM was created using LiDAR data with GPS field survey for data adjustment and accuracy calculations. The Mapping Quality Control Report for the LiDAR DTM is included as Appendix GN-06.
1.11 Construction Noise

The DBT shall ensure that all construction equipment shall be operated in compliance with all applicable City of Columbus ordinances and regulations pertaining to construction noise, including Section 2329.11 of the Columbus City Code. The DBT shall be responsible for any and all fines assessed due to non-compliance with the City noise ordinance. The DBT shall also coordinate monthly with the representatives of Shiloh Baptist church and St. Paul AME church in order determine the schedule of noise sensitive events at those historic sites and minimize construction noise during those times. A list of upcoming noise sensitive events, such as scheduled church services, weddings, and other gatherings shall be developed monthly by the DBT and the representatives of Shiloh Baptist Church and St. Paul AME Church. The DBT shall only be required to minimize noise for the listed noise sensitive events. The DBT shall keep minutes of the monthly coordination, including the lists of upcoming noise sensitive events. The DBT shall keep minutes of the coordination meetings and provide those minutes to the Department when requested.

The construction noise mitigation identified in the Construction Noise Analysis (See Appendix GN-02) and listed below shall be used to minimize construction noise during sensitive events at Shiloh Baptist church and St. Paul AME church. The following shall apply to construction activity within 500 feet of the church buildings during sensitive events:

A. Diesel powered vehicles shall not idle longer than 3 minutes. Idling times for other vehicles and internal combustion engine powered equipment shall also be minimized.

B. Routing construction equipment through the local street network shall be avoided or minimized.

C. Flashing Arrow Panels (FAPs) and Portable Changeable Message Signs (PCMS) shall be solar powered.

D. Jackhammers or pavement breakers shall be operated electrically or hydraulically. Pneumatic jackhammers shall only be used if equipped with pneumatic discharge mufflers, certified by the manufacturer.

E. Exhaust mufflers, certified by the manufacturer, shall be used on all internal combustion engines.

F. Use of electric saws rather than air or gasoline-powered saws shall be required.

1.12 Airway Highway Clearance for Airports and Heliports

It shall be the responsibility of the DBT to obtain any necessary airway/highway/heliport clearance from the Federal Aviation Administration (FAA) for this project both permanent and during construction.
1.13 **Limited Access**

This improvement shall be especially designed for through traffic and has been declared a limited access highway or freeway by action of the Director in accordance with the provisions of section 5511.02 of the Ohio Revised Code.

1.14 **Governing Regulations**

It shall be the responsibility of the DBT to acquire and utilize the necessary manuals that apply to the design and construction work required to complete this project.

ODOT standards and manuals take precedence over others listed unless noted otherwise in the Project Scope. For components not addressed by the standards listed, the applicable American Association of State Highway and Transportation Officials (AASHTO) standards and guidelines can be used as agreed to by the Department.

2010 Specifications: The Standard Specifications of the State of Ohio, Department of Transportation (CMS), including changes and Supplemental Specifications shall govern this project.

The 2008 National Fire Protection Association (NFPA) 502 shall govern this project. For all other NFPA codes and standards, the version in effect on October 1, 2010 shall be used.

The current edition, including updates released on or before January 30, 2011, of the following manuals and guidelines shall be met or exceeded in the performance of the design and construction work required to complete this project:

A. American Association of State Highway and Transportation Officials (AASHTO) Publications:

   a. A Policy on Design Standards - Interstate System
   b. A Policy on Geometric Design of Highways and Streets
      Bridge Welding Code
   c. Guide Design Specifications for Bridge Temporary Works
   d. Guide for the Development of Bicycle Facilities
   e. Guide Specifications for Design and Construction of Segmental Concrete Bridges
   f. Guide Specifications for Thermal Effects in Concrete Bridge Superstructures
   g. Laboratory Specifications
   h. LRFD Bridge Construction Specifications
   i. LRFD Bridge Design Specifications
   j. Manual for Bridge Evaluation
   k. Manual on Subsurface Investigations
m. Standard Specifications, 17th Edition (for existing structures only)
n. Standard Specifications for Highway Bridges
o. LRFD Guide Specifications for the Design of Pedestrian Bridges, 2009 (Long Street South Cap structure only)

B. ADA Accessibility Guideline US Access Board


D. CEB/FIP Model Code for Concrete Structures, Appendix E, Time Dependent Behavior of Concrete, Creep and Shrinkage

E. City of Columbus Publications:
   a. City of Columbus Construction & Materials Specifications
   b. City of Columbus Department of Sewerage & Drainage – Standard Construction Drawings
   c. City of Columbus DOPW-Power Standard Drawings & Specifications (Appendix UT-10)
   d. City of Columbus DOPW-Water Standard Drawings & Specifications (Appendix UT-12), City of Columbus Guidelines for Water Distribution System Capital Improvement Projects (Appendix UT-12) and City of Columbus DOPW-Water current Rules and Regulations.
   e. City of Columbus Sanitary Sewer Design Manual
   f. City of Columbus Stormwater Drainage Manual

F. Federal Highway Administration (FHWA) Publications:
   a. Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes
   b. Design and Construction of Driven Pile Foundations, Volumes I and II
   c. Drilled Shafts: Construction Procedures and Design Methods
   d. Geotechnical Engineering Circular Number 4, Ground Anchors and Anchored Systems
   e. Handbook on Design and Construction of Drilled Shafts Under Lateral Load
   f. HEC-14 Hydraulic Design & Energy Dissipates for Culverts and Channels
   g. HEC-15 Design of Roadside Channels with Flexible Linings
h. HEC-21 Design of Bridge Deck Drainage
i. HEC-22 Urban Drainage Design Manual, Second Edition
j. Manual for Design & Construction Monitoring of Soil Nail Walls
k. Manual of Uniform Traffic Control Devices (MUTCD)
l. Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines
m. Subsurface Investigations – Geotechnical Site Characterization
n. The Cone Penetration Test
o. The Pressuremeter Test for Highway Applications
p. Standard Connection Publication (the Department to provide)
q. 23 CFR 630.1012 Work Zone Safety and Mobility – Project Level Procedures

G. National Cooperative Highway Research Program (NCHRP) 350 Hardware Report

H. National Electric Code (NEC)

I. National Electric Safety Code (NESC)

J. Ohio Department of Transportation (ODOT) Publications:
   a. Asbestos Inspection for Bridges Guidelines
   b. Bridge Design Manual, 2004 (LFD), for existing structures only
   c. Bridge Design Manual, 2007 (LRFD), for all new structures
   d. CADD Engineering Standards Manual
   e. Cultural Resources Manual
   f. Design Guidance for Independent Bicycle Facilities
   g. Design Mapping Specifications
   h. Ecological Manual
   i. Environmental Sites Assessment Guidelines
   j. Geotechnical Bulletins
      i. GB1-Plan Subgrades
      ii. GB2-Special Benching and Sidehill Embankment Fills
      iii. GB4-Guidelines for the use of Geotechnical Instrumentation
      iv. GB9-Geotechnical Software
k. Geotechnical Engineering Checklists
l. Guidelines for Identifying Acceptable Locations for the Disposal of Waste Material and Construction Debris or the Excavation of Borrow Material within ODOT Right-of-Way
m. Location and Design Manuals

   i. Volume One - Roadway Design, with modifications provided in Appendix GN-09.

   ii. Volume Two - Drainage Design

   iii. Volume Three - Plan Preparation

n. Office of Environmental Services Handbooks and Guidelines

o. Ohio Manual of Uniform Traffic Control Devices (OMUTCD)
q. Plan Insert Sheets
r. Public Involvement Guide
s. Quality Standards for Temporary Traffic Control Devices
t. Qualified Products List (QPL)
   (http://www.dot.state.oh.us/divisions/constructionmgt/materials/pages/qpl.aspx)
u. Railroad Coordination Policy and Procedures Manual
v. Real Estate Policies and Procedures Manuals
w. Roadway Safety Landscaping Guidelines
x. Sign Design Manual (SDM)
y. Specifications for Geotechnical Explorations
z. Standard Construction Drawings (SCD’s) – all series
bb. Survey Manual
cc. Traffic Engineering Manual (TEM)
ee. Wireless Communication Tower Manual
ff. Waterway Permit Manual
1.15 Supplemental Specifications

The DBT shall perform work as applicable in accordance with the most recent revision, prior to January 30 2011, of the supplemental specifications listed below. Supplemental Specifications modified specifically for this contract are included in the Appendix, as indicated in the list below. Other ODOT supplemental specifications shall govern depending on DBT design and construction.

- SS 800: Revisions to the 2010 Construction & Material Specifications
- SS 802: Constructing and Inspecting Pipe Culverts, Sewers, Drains, and Drainage Structures
- SS 804: Fiber-Optic Cable for Traffic Signal Interconnect
- SS 823 (Modified): Construction Layout Stakes and Survey Monuments, provided as Appendix GN-11
- SS 832 (Modified): Temporary Sediment and Erosion Control, provided as Appendix GN-03
- SS 836: Seeding and Erosion Control with Turf Reinforcing Mat
- SS 839: Trench Drain System
- SS 840: Mechanically Stabilized Earth Wall
- SS 861: Geogrid for Subgrade Stabilization
- SS 878 (Modified): Inspection and Compacting Testing of Unbound Materials, provided as Appendix GN-07
- SS 879 (Modified): QC/QA Embankment, provided as Appendix GN-08
- SS 902: Conduit Inspection Equipment

1.16 Coordination with Other Projects

Separate contractors may be working within the project area on other construction projects on the Interstates and the surface streets. See CMS Section 105.08.

The DBT shall cooperate with all City of Columbus projects and Department projects that are in various stages of design or construction. The following is a list of known City projects:

- Chestnut and 6th Combined Sewershed
- Mt Vernon Waterline improvement
- 5th Avenue & Cleveland Avenue intersection
- I-670 Westbound at 4th Street Ramp
- I-670 at 4th Street landscaping improvements
- Edwards Street, 5th St. to 6th St.
- CCAD Streetscape, Cleveland Avenue (Broad St. to Long St.)
- St. Clair Avenue (Old Leonard Ave. to Mt Vernon Ave.)
- Columbus Traffic Signal System (CTSS) Communications
- Operation Safewalks - Mt Vernon Avenue (5th St. to 6th St.)
- Resurfacing of 4th St (Broad Street to bridge over I-670)
- Naghten Street Sewer Rehabilitation project

A map of these projects is provided in Appendix GN-04.

The following is a list of known ODOT projects (with approximate start dates subject to change):
- FRA-70-13.22R (over the Scioto) - Bridge Repair (May 2011)
- FRA-71-19.09 - Noisewall Construction (active)
- FRA-71-19.61 (11th over I-71) – Bridge Deck Replacement (June 2011)
- FRA-23-12.11 (4th Street) – Bridge Deck Replacement (May 2011)
- FRA-23D-2.82 (3rd Street) – Bridge Rehabilitation (June 2011)
- FRA-Africentric Retaining Wall (I-70EB at I-71NB) – Retaining Wall (Jan 2012)
- Fra-670-3.87 (670WB to 4th Street Ramp) – Bridge Repair (Mar 2012)
- FRA-3-15.42 – Pavement Resurfacing (Aug 2012)
- FRA-70-14.48 (Second Project – 70/71) – Major Reconstruction (Aug 2013)
- FRA-71-18.54 – Pavement Resurfacing (April 2013)
- FRA-33D-1.00 (Spring St) – Pavement Resurfacing (Mar 2013)

Maps of these projects are provided in Appendix GN-10.

1.17 Co-Location Facilities for DBT and Department Forces

1.17.1 Project Management Office

The DBT shall co-locate with Department personnel for the duration of the Project. It is the Department’s intent to co-locate with the DBT in order to facilitate active participation between Department and the DBT during the Project. The DBT shall provide office space for this collocation requirement within one (1) mile of the Project Location. The following requirements are for Department forces only. DBT is responsible for determining additional project management office requirements to accommodate the DBT’s forces. The DBT shall provide a field office for use by Department forces in accordance with CMS 619 except as modified by the following:

Provide the following items and features for the required office space and facilities within 45 days after Contract award date:

A. New or like new office furniture for the entire office space
B. A copier, printer, fax and scanner system per the specifications listed below in 1.17.2
C. Capability for the Department to install a 10-meg Ethernet connection between the Project management staff offices and District 6 Headquarters
D. All rooms, cubicles, conference and work rooms shall have network drops from the Department provided Network Switch and jacks installed by the DBT for use by the Department’s staff.
   a. One network drop shall be provided at each work desk
   b. Four network drops shall be provided in the conference room
E. The Department shall obtain and pay for an internet connection. The Department shall provide the necessary network equipment and communication circuits to connect the field office to the
Department network. District 6 IT personnel shall install the following equipment in the field office:

a. Locked Cabinet w/UPS
b. Network Switch

F. Office space for the Department’s staff that has, at a minimum, the following:

a. Twelve (12) offices (150 square feet, each enclosed office space with individual locking door)
b. Eight (8) cubicles (100 square feet each)
c. Receptionist area (100 square feet min.) with counter area located at main entrance.
d. One (1) enclosed conference room (600 square feet), with the following items provided:
   1. a computer projector
   2. 7’ wide projection screen (minimum)
   3. Tables and chairs (40 seat minimum)
   4. 2 Easels
   5. 2 Wipe-off boards (20 square foot minimum)
e. Break room with sink (150 square feet, with 12 square feet of counter space, microwave oven and a 20-cubic-foot refrigerator)
f. Janitorial closet with oversized sink.
g. Two enclosed workrooms (400 square feet each) with 6 desks and chairs for each
h. Lockable copy/filing room (400 square feet)
i. Two lockable closets (25 square feet each)
j. An appropriate number of desks, chairs and filing cabinets
k. Four (4) licensed copies of the following software:
   1. Oracle Primavera Project Manager (P6)
l. Hard-surfaced (paved) parking, for 50 spaces to include snow removal. The cost of providing these parking spaces shall be included in the cost of the Project Management Office.
m. Include potable hot and cold water. Separate Male/Female toilet/washroom facilities must be appropriately sized for this size office space. Facilities must be ADA compliant. Furnish all lavatory and sanitary supplies.
n. Weekly cleaning services of entire project management office to include restrooms and trash removal.
o. Security shall be provided for the field office and surrounding parking facilities by illuminating all sides of the field office and enclosed within 8-foot fence with lockable gate and 24 hour security system.

G. The base radio with four (4) hand held units shall not be required.

1.17.2 Copier, Printer, Fax, and Scanning System Specifications

A. Automatic document feeder with 80-sheet ARDF
B. Equipped to handle paper up to and including 11-inch x 17-inch (originals and copies) including mixed originals
C. Reduction and enlargement features
D. Unlimited duplexing for all size originals 8.5-inch x 11-inch through 11-inch x 17-inch
E. Manual and selectable automatic exposure settings
F. Operate on standard voltage with no special or dedicated lines
G. Stapler/finisher support with the following features:
   a. Paper size support for 5.5-inch x 8.5-inch to 11-inch x 17-inch/A6 to A3
   b. Paper Weight support from 16 to 42 lb. Bond/60 to 157g/m2
   c. Staple Position three (3) positions (1 staple/2 positions; 2 staples/1 position)
   d. Staple Capacity – 50 sheets (8.5-inch x 11-inch) 30 sheets (8.5-inch x 14-inch or larger)
H. 1 to 999 sort capacity
I. Paper Capacity – 500 sheets x four (4) trays, 50-sheet Bypass tray
J. Paper Weight Support – 20 to 28 lb. Bond/64 to 105g/m2 (Trays 1,2,3 & 4) 16 to 44 lb. Bond/52 to 163g/m2 (Bypass) 20 to 28 lb. Bond/64 to 105g/m2 (Duplex)
K. Energy Star compliant
L. Network printer capability with 10BASET/100BASETx network card
M. Printer speed 35 ppm
N. Network protocol support for TCP/IP
O. Network operating system for Windows XP Professional
P. Client Print driver support for Windows XP/Vista (Both PCL/PS drivers)
Q. Minimum print resolution of 600 x 600 dpi
R. Secure printing with password or pin
S. Network scanning that supports the following:
   a. Scan Speed 52 ipm (@200 dpi)
   b. Scan Area up to 11-inch x 17-inch
   c. Grayscale – 256 levels (Color Required)
   d. Scanning Resolution – 600 dpi
   e. Scanning Protocol Support – TCP/IP, SMTP, SMB, FTP, POP3, NCP
   f. Scanning support for Scan-to-Email, HDD, Folder, URL, and TWAIN
   g. File Formats – Single Page TIFF, JPEG, PDF, Multi-Page TIFF, PDF
   h. Address book support for multiple items
   i. OCR software that supports TIFF, PDF, Multi-Page TIFF, and Multi-Page PDF
   j. OCR software must support batch workflow processing of documents
T. Minimum shared memory capacity for all options – 384 MB
U. Hard Disk Drive – 40 GB drive for internal storage and network scanning
V. Analog Fax Support for PSTN, PBX that supports the following:
   a. Resolution – 200 x 200/100 dpi 400 x 400 dpi (optional)
   b. 33.6 Kbps with Auto Fallback
   c. Address Book and Auto-Dial Number Storage
W. Black & White and color capable
X. All copier/printer maintenance and supplies (toner, paper, etc.)
1.18 Preconstruction Audio-Video Color Recording

The DBT shall provide the Department with preconstruction audio-video color recording as follows:

1.18.1 General

A. Recording. Construction in any area shall not start until the area has been recorded and the DVDs submitted to the Department.

B. Visual Inspection. Prior to recording, all areas to be recorded shall be investigated visually with notation made of features not readily visible by recording methods. This would include, but not be limited to, culverts (size, type and condition) and manholes that may be partially buried. Record all measurements made during the inspection.

C. Approvals. All recording shall be conducted in the presence of the Department unless waived by the Department. At the start of recording, the DBT shall submit a sample recording of a portion of this Project for the Department to review. The sample recording shall be approved before any other recording is allowed.

D. Certification. Upon completion of the work, the DBT shall provide Certification in writing to the Department that all the requirements of the audio-video color recording for this Project were accomplished in accordance with these specifications:

   a. Identification. All recordings (DVDs and cases) shall be properly identified by recording number, location, and project name in a manner acceptable to the Department.

   b. Record. A record of the contents of each recording shall be supplied on a run sheet identifying each segment in the recording number, location, and project name in a manner acceptable to the Department.

   c. Inventory. A brief report and inventory of all recordings completed, referenced by location and recording number, shall be furnished to the Department upon completion of the work and delivery of the recordings. All recordings and written records shall become the property of the Department.

1.18.2 Video Information

A. Audio Preamble. Each recording shall begin with the current date, project name, and municipality and be followed by the general location (e.g., name of the street or property owner, location of cross country line, viewing side, and direction of progress).

B. Date and Time. To preclude the responsibility of tampering or editing in any manner, all video recordings shall, by electronic means, display continuously and simultaneously generated transparent digital information to include the date and time of recording. The date information shall contain the month, day and year; for example, 10/5/83. The time information shall consist of hours, minutes, and seconds separated by colons; for example, 10:35:18.
C. **Stationing.** The Engineering stationing shall correspond to the project stationing and include the standard Engineering symbols (e.g., 14+84). The Engineering stationing shall represent the location of the camera. If the Engineering stationing is not recorded simultaneously with recording, the stationing shall be noted on Audio Track 1. This transparent information shall appear in the lower half of the viewing screen. Houses and buildings shall be identified by an address when visible.

D. **Information.** Below the Engineering stationing, periodic transparent alpha-numeric information consisting of the names of the project, name of the area covered, direction of travel, viewing side, etc., shall appear.

### 1.18.3 Coverage

A. **General.** Recorded coverage shall include, but not be limited to, all existing driveways, sidewalks, curbs, ditches (drainage patterns are of particular concern), streets (including condition of paving for full width), landscaping, trees, culverts, catch basins, headwalls, fences, visible utilities and all buildings (interior and exterior) located within the zone of influence of construction. Of particular concern are existing faults, fractures, defects or other imperfections.

A. **Streets.** Unless otherwise noted, streets and street areas shall be recorded by audio video for full width of the zone of influence of construction, including both sides of the street. The term “street” shall be understood to mean street, highway, avenue, boulevard road, alley, lane, driveway, parking lot, etc., and all adjacent areas within the possible zone of the influence of construction.

### 1.19 Sustainability

The Project Scope defines a number of requirements related to the implementation of sustainable practices throughout the design and construction of the Project. In addition, the DBT shall demonstrate a commitment to sustainability and shall propose additional efforts to maximize the implementation of sustainable practices in all aspects of the Project.

**1.19.1 Sustainability Plan**

As part of the Technical Proposal, the DBT shall submit a Sustainability Plan that describes the DBT’s approach and commitment to sustainable design and construction practices. The plan shall describe the DBT’s approach to the following:

A. **Energy and Energy Efficiency.** The Sustainability Plan shall describe the DBT’s plans for maximizing energy efficiency throughout the Project, including:
   a. Incorporation of low-energy lighting.
   b. Minimizing energy and fuel usage during construction.
   c. Incorporating materials which may use less energy to manufacture.

B. **Community Environment.** The Sustainability Plan shall describe the DBT’s commitment to environmental quality and enhancement above and beyond the commitments of the FONSI (Finding of No Significant Impact), including
   a. Minimizing air quality degradation during construction.
b. Proposals to quantify and minimize the Project’s carbon footprint.
c. Minimizing noise during construction.

C. **Green Building.** The DBT will consider locating the Project Management Office in existing, currently unused office space. The DBT may propose the use of a LEED (Leadership in Energy and Environmental Design) certified Green Building for the Project Management Office. If the DBT makes this commitment, certification will be required per the third party independent certification procedures defined by the U.S. Green Building Council (refer to www.usgbc.org).

D. **Recycling / Reuse / Material Reduction.**
The Sustainability Plan shall include a Recycling / Reuse / Material Reduction Management Plan. The Recycling / Reuse / Material Reduction Management Plan shall include the following:

- Name of individual(s) responsible for waste prevention and management.
- Actions that will be taken to reduce solid waste generation.
- Description of the regular meetings to address waste management.
- Description of the specific approaches to be used in recycling/reuse.
- Waste characterization; estimated material types and quantities.
- Name of landfill and the estimated costs, assuming no salvage or recycling.
- Identification of local and regional reuse programs.
- List of specific waste materials to be salvaged and recycled.
- Estimated percentage of waste diverted by this Plan.
- Recycling facilities to be used.
- Description of the means by which any materials to be recycled or salvaged will be protected from contamination.

For each of the four parts (A, B, C and D) the Sustainability Plan will discuss the following:

1. Sustainability initiatives that result in permanent benefits vs. temporary benefits.
2. Sustainability initiatives that result in benefits that can be easily verified, quantified and documented.
3. Sustainability initiatives that clearly demonstrate return on investment.

For Part D (Recycling / Reuse / Material Reduction Management) the DBT shall be required to document their actual waste diversion performance throughout the project. The Recycling / Reuse / Material Reduction Management Plan, therefore, shall include progress reporting procedures to record actual diversion.

The Recycling / Reuse / Material Reduction Management Plan shall also be incorporated into the DBT QA/QC process and updates shall be submitted to the Department with cost estimates.

**1.19.2 Un-Usable Materials**
Un-Usable Material management is an integral part of the project's development. The Design Build Team (DBT) shall engage in waste management to some degree throughout the project. Initially, the DBT team shall establish waste reduction goals and define what levels of diversion are achievable and reasonable under the project's conditions. These waste reduction goals will be incorporated into the contract documents.

Title to all debris and un-usable materials is vested to the DBT, and any and all economic benefit from the salvage, resale, recycling of materials shall be reflected in the DBT’s bid. These include cost avoidance through reduced debris tipping expenses, revenues from salvaged and recycled materials, and cost avoidance by using materials taken from the jobsite back into the project.

The DBT shall apply the following waste hierarchy in the planning, design and construction of the Project:

- **Avoid Un-Usable Material** – consider any opportunities for carrying out renovation rather than a complete demolition and reconstruction or rebuild.
- **Minimize Un-Usable Material** - avoid creating the waste (such as crush and recycle concrete on and use it as per Department specifications for the new construction on the site). That way no waste is created, and the aim of minimizing waste is met.
- **Recycle** - find another use for materials (for example collect materials such as wood and return them to a central processing point where the wood may be ground into landscaping material and mulch).
2 Quality Management

2.1 General

The DBT has the responsibility for the quality of the Work, including, but not limited to, products of subcontractors, sub-consultants, fabricators, suppliers and vendors.

The DBT must employ an Independent Quality Firm (IQF) who will be responsible for verifying and documenting all quality related data for the Department including:

- A. Design
- B. Testing
- C. Inspection
- D. Geotechnical investigations
- E. Environmental activities
- F. Maintenance of Traffic plans
- G. Survey Verification
- H. Computer database of materials testing results

2.2 Independent Quality Firm

In order to maintain complete and strict independence of the IQF from the DBT’s day-to-day organization, the IQF will report to both the Department and the DBT. The IQF will be responsible for providing qualified personnel and verifying that the Project quality requirements are met. Although the IQF is employed by the DBT, the DBT is not permitted to terminate or seek the termination or removal of any IQF personnel without the expressed written permission from the Department.

The IQF will:

- A. Be an independent firm and must not be owned by the DBT or any of its joint venture members, partners, or affiliated entities;
- B. Be considered as a Major Participant in the organization of the DBT. The IQF position in the DBT’s table of organization should be a direct report to the DBT Project Manager. The IQF will have the authority required to stop all design work and construction work if all quality requirements are not being met, exclusive of schedule or cost; and
- C. Have the ability to provide either a permanent or a temporary testing laboratory meeting contract and Quality Management Plan (QMP) requirements within 20 miles of the Project site. If major components of the project are constructed off the project site, other testing facilities may be utilized that meet all contract and QMP requirements.

The IQF will include the following three (3) lead members to manage and implement the Quality Program:

- A. Independent Quality Manager (IQM)
- B. Independent Construction Quality Manager
- C. Independent Design Quality Manager
The duties of the three lead members are defined in Sections 2.6.1.1, 2.6.1.2 and 2.6.1.3 respectively. All three lead members of the IQF shall be named in the Technical Proposal.

### 2.3 Quality Management Plan

The DBT with the Department’s participation shall develop and implement a written Quality Management Plan (QMP) for all elements of the Project, including, but not limited to, management, administration, design, geotechnical investigations, construction, testing, and environmental monitoring and compliance. Figure 2-1 presents a general overview of the quality management process. Additional details are provided throughout Section 2.6.

The DBT shall engage the Department in the QMP development process to facilitate the process and ensure understanding. The Department’s participation in the development of the QMP does not waive the DBT’s responsibility for the quality of the Work, nor does it ascribe any responsibility to the Department for the Work. Further, this involvement does not preclude subsequent rejection of the QMP by the Department.

The implemented QMP shall accomplish the following quality functions and objectives:

A. Successfully achieve the goals of the Project listed in Section 1.2, Project Requirements
B. Successfully deliver the Project within the accepted Critical Path Method (CPM) schedule for the Project
C. Construct a high quality Project as described in the contract documents
D. Provide a complete quality program that uses quality control, verification and quality assurance principals to eliminate non-conforming items and ensure that any non-conforming items are detected and corrected.

The QMP shall address the responsibilities for each of the following quality components:

A. Procedures for Design Quality Control performed by the DBT Designer
B. On-site Process Quality Control Inspection and Process Quality Control Testing performed by the DB Contractor
C. Verification procedures (i.e. the IQF Inspection and IQF Testing), performed by the IQF

The QMP will delineate how the DBT will ensure that all disciplines, aspects and elements of the Work will comply with the requirements of the Contract Documents and that all materials incorporated into the Work will perform satisfactorily for the purpose intended and conform to the contract requirements. The DBT may use any nationally accepted format for the QMP.
**QMP OVERVIEW**

- **DBT Designer** designs Interim Plan for a Buildable Unit.*
- **Separate DB Designer** checks and reviews Interim Plan.*
- **IQF Design Quality Manager** conducts interim review with Department and other interested parties (FHWA, City, utilities, railroads, etc.).
- **DB Designer** designs Final Plan.*
- **Separate DB Designer** checks and reviews Final Plan.*
- **IQF Design Quality Manager** conducts Final Review with ODOT and other interested parties.
- **IQF** conducts Release for Construction Review.
- **IQF** approves “Released for Construction” Plans.
- **DB Contractor** constructs Physical Project Work.
- **DB Contractor** performs Process Quality Control Inspection and Testing.
- **IQF Construction Quality Manager** performs quantity checking, material certification, testing, documentation and other quality management duties as outlined in the QMP.
- **DB Project Manager** submits Certified Request for progress payments to ODOT per CMS 109.09.
- **IQF** verifies and documents that Work has been completed in compliance with the Contract.
- **ODOT** verifies quality and quantity of Work based on IQF and independent ODOT information.
- **ODOT pays for completed and verified Work.**

*IQF performs ongoing Over-the-Shoulder Reviews with involvement of ODOT, City, utilities, etc.
2.4 Relationship of DBT with the IQF and the Department

2.4.1 DBT Responsibilities
The DBT is responsible for compliance with all contract requirements. The DBT is responsible for performing all quality control required to assure contract compliance and making required adjustments to achieve this compliance.

The DBT, not including the IQF, is responsible for Process Quality Control as defined in Section 2.6.1.8.

The DBT is responsible for immediately identifying and resolving any non-conforming items found by its quality control processes, the IQF’s verification processes, or the Department’s Quality Assurance processes.

2.4.2 IQF Responsibilities
The IQF is required to verify and document whether or not the DBT has completed the Project and/or portions of the Project in compliance with the contract’s requirements for both design and construction.

The IQF shall have the authority from the DBT to reject design work, suspend construction work as per CMS 104.2c, and reject material as per CMS 106.07 if quality requirements are not being met, exclusive of schedule or cost. The only authority able to overrule the IQF is the Department.

2.4.3 Department Responsibilities
The Department shall perform Quality Assurance to validate and document the DBT’s quality control and the IQF’s quality verification processes. Quality Assurance reviews that are performed by the Department only represent a sampling of the Work and do not relieve the DBT of the contract compliance requirements.

The Department’s role in the Quality Program is to:

A. Actively participate in quality checkpoints (QCP) (Section 2.6.5.25), over-the-shoulder reviews (Section 2.6.4.8) and interim/final design reviews (Section 2.6.4.9)
B. Review the IQF’s material sampling and testing results.
C. Perform the Department’s Quality Assurance functions required to provide the Department assurance that contract provisions have been met and to fulfill the Department’s responsibilities to FHWA as required in 23 CFR 637.
D. Conduct Department quality assurance testing at the frequency determined in paragraph C; or if no frequency is specified, at approximately 10% of the IQF Testing. However, the Department reserves the right to conduct testing at any time and frequency.
E. Monitor/audit the DBT’s Quality Program activities, including IQF activities, to confirm adherence to the QMP.
F. Audit the IQF’s records.
G. Conduct Department Independent Quality Assurance Reviews of inspection and testing personnel and of inspection and testing equipment.
H. Perform the off-site Quality Assurance inspection and testing for the fabrication of precast and pre-stressed concrete elements and of structural steel.
I. Perform the final inspection and validation conforming to CMS 109.11 and 109.12 and to include a final audit of IQF records for a final conformity evaluation of the work to the requirements of the contract.

J. Maintain all authority under C&MS to accept and reject non-conforming design, construction and materials.

K. Maintain its responsibility for utility coordination as per Section 2.6.2.8.6, but will use the IQF to support its control of design submittals, scheduling, notification and documentation requirements. The DBT shall obtain Department approval for any proposed changes to the utility agreements. Any approved changes to the terms of the agreement between the Department and the utility owners that result in adverse impacts to the Project in terms of cost, time or other liabilities will be sole responsibility of the DBT.

2.4.4 Department Access to Testing Facilities

The Department reserves the right to:

A. Check DBT’s, including the IQF’s, testing equipment for compliance with specified standards.
B. Check DBT’s, including the IQF’s testing procedures and techniques.
C. Access the testing facilities of independent testing agencies in order to witness testing, verify testing procedures and techniques, and review lab personnel certifications and test results at no additional cost to the Department.

2.4.5 Suspend Work

If there is evidence that the QMP procedures are not being followed, or if the materials or workmanship are not meeting the contract requirements, the Department may, at its sole discretion, suspend Work until appropriate quality procedures have been established and the QMP has been revised and approved. In addition, the Department retains authority to suspend Work without liability wholly or in part if the DBT fails to do either:

A. Correct conditions that are unsafe for Project personnel or the general public; OR
B. Correct unacceptable design or construction practices.

2.4.6 Definitions of Department Activities

The Department will coordinate its quality activities via the following components.

Department Independent Assurance: Department Independent Assurance comprises split sampling and testing performed by the Department. These tests and observations of both the IQF Testing and the Design Build Team’s Quality Control sampling and testing procedures are performed to:

A. Confirm that all testers are qualified and certified.
B. Confirm that test methods and procedures are performed accurately.

This function may also be performed by the Department’s Project personnel any time there is a question about IQF Inspection or IQF Testing procedures or personnel.
**Department Quality Assurance Inspection:** Department Quality Assurance Inspection is the oversight inspection of the DBT’s Work by the Department, including:

A. The Department’s participation in the quality control checkpoint meetings.
B. Audits of all documentation to confirm that the DBT and the IQF are achieving the Contract obligations and commitments.
C. The Department’s inspection of off-site fabrication of structural steel and of precast and prestressed concrete structures. This inspection does not remove the DBT’s responsibility for conformance to contract requirements for these items.

**Department Quality Assurance Testing:** Department Quality Assurance Testing encompasses material sampling and testing performed by Department personnel that are used to statistically compare and validate the results of the IQF’s tests, in accordance with individual specifications of the Construction and Materials Specifications, Supplemental Specifications, and the contract documents. The Department Quality Assurance Testing tests will be conducted at the frequency required, or if no frequency is specified at approximately 10% of the IQF Testing. However, the Department reserves the right to conduct testing at any time and frequency. The IQF Testing test results will be used for acceptance, if the Department Quality Assurance Testing tests are validated with the IQF Testing tests.

### 2.5 Timing of QMP Activities

#### 2.5.1 Initial Project Activities
Except for preliminary meetings, development of the Critical Path Method schedule, limited preliminary design work and the development of the QMP, no Work shall begin on the Project before the Department has approved the QMP or Interim QMP.

#### 2.5.2 QMP Approval
The Department shall approve or reject each QMP submission within 15 Working Days following Department’s receipt of the QMP. After the QMP has been approved, any revisions to the Plan, staffing levels, or key quality personnel, as defined in Section 2.6.1, shall require prior written Department approval. If the DBT chooses to submit an interim CPM schedule, the Department will allow the submittal of an interim QMP for the same period as the approved interim CPM. The associated interim QMP shall be approved by the Department before work under the interim CPM schedule can progress. The interim QMP must cover quality functions for the work to be performed in the interim CPM.

As part of the QMP acceptance process, the Department will evaluate Quality Assurance (QA) alternatives and determine the level of QA to be performed for both design and construction. Alternative QA options, if any, will be evaluated by the Department as part of this process.

#### 2.5.3 Construction Activities
Construction of any Work shall not begin until the design for that portion of the Work is complete; has been accepted through the approved QMP process; has been “released for construction” in accordance with Section 2.6.4.11; and has been signed and sealed by a Registered Professional Engineer in conformance with the Ohio Revised Code.
2.5.4 Quality Checkpoint (QCP)
A QCP is a point in time when construction has proceeded to a stage as defined in Section 2.6.5.25 at which representatives of the DBT and the IQF, including the Independent Construction Quality Manager and the Department’s Engineer, determine the progress to date by reviewing any or all of the following:

A. Daily inspection reports
B. IQF Testing and Department Quality Assurance Testing reports
C. Foundation records
D. Survey records
E. QMP records
F. Department Quality Assurance Results
G. Any other pertinent data to determine acceptable work

The parties then judge whether to accept or reject the completed Work. No additional Work will take place past the QCP until all parties agree that the Work up to that point is acceptable. When the parties cannot agree the Department will not allow Work to proceed beyond the QCP.

2.6 Quality Management Plan Contents

At a minimum the QMP shall include: procedures for Design Quality Control and checking performed by the DB Designer, on-site Process Quality Control Inspection and Process Quality Control Testing performed by the DB Contractor, and the verification responsibilities (i.e. the IQF Inspection and IQF Testing), which are performed by the IQF. The plan includes the methods, procedures and organization that will ensure the quality of all components of the Project.

The QMP submitted by the DBT will be organized into the following sections and address requirements as outlined in Section 2:

<table>
<thead>
<tr>
<th>QMP SECTION NUMBER</th>
<th>QMP SECTION TITLE</th>
<th>PROJECT SCOPE SECTION REFERENCE</th>
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<td>1</td>
<td>Management</td>
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<td>Administration</td>
<td>2.6.2</td>
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<td>3</td>
<td>Design related Investigations and Testing</td>
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<td>4</td>
<td>Design</td>
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<td>8</td>
<td>Approvals</td>
<td>2.6.8</td>
</tr>
</tbody>
</table>

2.6.1 QMP Section 1 - Management Requirements

QMP Section 1 (Management) will describe the quality management organization of the DBT, including the IQF. The QMP will include the following:
A. An organizational chart showing lines of authority and reporting responsibilities for all Project Work

B. The name, position, qualifications, duties, responsibilities and authorities of each person proposed for a quality management function, including the following key quality staffing positions:
   a. Independent Quality Manager (IQM)
   b. Independent Construction Quality Manager
   c. Independent Design Quality Manager
   d. Independent Lead Highway Inspector
   e. Independent Lead Structural Inspector

Each key staffing position must be filled by a person who does not have any other responsibilities on the Project. Personnel identified in the Technical Proposal will not be allowed to be changed in the final QMP.

Key quality staff must:
   A. Be located at the Project offices.
   B. Be an employee of the IQF (or an employee of a consultant to the IQF).
   C. Have sufficient authority and organizational freedom to identify quality problems, and to recommend, provide and verify implementation of solutions.
   D. Be at an organizational level high enough to ensure that Project schedule, performance or cost will not influence implementation of quality management measures.

2.6.1.1 Independent Quality Manager

The QMP will name the IQM, who will be responsible for the overall management and implementation of all elements of the QMP. The IQM will report both to the DBT and to the Department’s Engineer. This position is required for the entire duration of the Project. The IQM must have no less than 10 years of experience in quality management after becoming a licensed Professional Engineer. The IQM must be a licensed Professional Engineer in Ohio by the time of the Technical Proposal submittal or demonstrate the ability to become licensed by the time of award of the contract. The IQF will not replace the IQM without prior written approval from the Department. A request to replace the IQM will include a name of a proposed replacement manager and complete details of the replacement’s qualifications. If approved, the replacement will be on site within five working days of Department approval of the change.

2.6.1.2 Independent Construction Quality Manager

The QMP will name the Independent Construction Quality Manager, who will be responsible for the verification of the quality of the construction elements of the Project. The Independent Construction Quality Manager must have no less than eight (8) years of experience in construction quality management and inspection and testing after becoming a licensed Professional Engineer. The Independent Construction Quality Manager must be a licensed Professional Engineer in Ohio by the time of the Technical Proposal submittal or demonstrate the ability to become licensed by the time of award of the contract. This position is required for the duration of all construction related activities on the Project. The IQF will not replace the Independent Construction Quality Manager without prior written approval from the Department. A request to replace the Independent Construction Quality Manager will include a name of a proposed replacement manager and complete details of the replacement’s qualifications. If approved, the replacement will be on site within five working days of Department approval of the change.
2.6.1.3 **Independent Design Quality Manager**

The QMP will name the Independent Design Quality Manager, who will be responsible for the verification of the quality of the design elements of the Project. The Independent Design Quality Manager cannot be part of any of the design firms for the Project or share similar ownership. The Independent Design Quality Manager must have no less than eight (8) years of total design engineering experience on projects with similar scope and complexity after becoming a licensed Professional Engineer. The Independent Design Quality Manager must be a licensed Professional Engineer in the State of Ohio by the time of the Technical Proposal submittal or demonstrate the ability to become licensed by the time of award of the contract. This position is required for the entire duration of all design activities on the Project. The IQF will not replace the Independent Design Quality Manager without prior written approval from the Department. A request to replace the Independent Design Quality Manager will include a name of a proposed replacement manager and complete details of the replacement’s qualifications. If approved, the replacement will be on site within five working days of Department approval of the change.

2.6.1.4 **Independent Lead Highway Inspector**

The Independent Lead Highway Inspector is responsible for the inspection and field documentation of all highway elements on the Project including but not limited to embankments, drainage, pavements, signage, striping, ITS, lighting, Maintenance of Traffic, etc. The Independent Lead Highway Inspector must have a minimum of seven (7) years experience in performing testing and inspection on highway projects. The Independent Lead Highway Inspector must be a licensed Professional Engineer in Ohio by the time of Technical proposal submittal or demonstrate the ability to become licensed by the time of award of the contract. The Independent Lead Highway Inspector must have worked at least two (2) years in a similar capacity on highway projects with applicable scope and complexity. This position is required for the duration of all construction activities on the Project. The IQF will not replace the Independent Lead Highway Inspector without prior written approval from the Department. A request to replace the Independent Lead Highway Inspector will include a name of a proposed replacement inspector and complete details of the replacement’s qualifications. If approved, the replacement will be on site within five working days of Department approval of the change.

2.6.1.5 **Independent Lead Structural Inspector**

The Independent Lead Structural Inspector is responsible for the inspection and field documentation of all structural elements on the Project including but not limited to bridges, box culverts, walls, foundations, etc. The Independent Lead Structural Inspector must have a minimum of seven (7) years experience working in performing testing and inspection on structures for highway projects. The Independent Lead Highway Inspector must be a licensed Professional Engineer in Ohio by the time of Technical proposal submittal or demonstrate the ability to become licensed by the time of award of the contract. The Independent Lead Structural Inspector must have worked at least two (2) years in a similar capacity on highway projects with applicable scope and complexity. This position is required for the duration of all construction activities on the Project. The IQF will not replace the Independent Lead Structural Inspector without prior written approval from the Department. A request to replace the Independent Lead Structural Inspector will include a name of a proposed replacement inspector and complete details of the replacement’s qualifications. If approved, the replacement will be on site within five working days of Department approval of the change.
2.6.1.6 Other IQF Staff Responsibilities

The IQF inspection staff and geotechnical and environmental monitors will check for compliance with all permits, environmental monitoring and construction operations. Staff will be on site to monitor all field operations for their disciplines. Construction operations requiring continuous field sampling and testing will proceed only in the presence of the assigned IQF staff personnel.

The IQF staff will monitor the DBT’s coordination effort with the Utility Owners to verify that adequate notification is provided to the Utility Owners for them to inspect construction activities performed on or around their facilities. They will also verify that the Utility Owners have the opportunity to conduct design reviews of Project activities near their facilities.

All on-site Work will be inspected by the IQF’s staff, except that certain portions of Work may be inspected by qualified individuals who are employees of or retained by manufacturers, vendors or Suppliers, if approved in writing by the Department.

2.6.1.7 IQF Staff Qualifications

IQF staff will be employees of the IQF or its accepted sub-consultant and will have been trained in the applicable procedures for inspection of Work, geotechnical and environmental monitoring, and material sampling and testing. The professional training and experience of the IQF staff (including hydrologists, and geotechnical engineers, etc.) will be commensurate with the scope, complexity, and nature of the activity to be inspected, monitored, or tested and verified.

2.6.1.8 DBT Process Quality Control Staff Qualifications

Process Quality Control Inspection and Process Quality Control Testing are the inspection and material sampling and testing performed by the DBT’s certified personnel as products are being manufactured and processed on site. The purpose of process control sampling and testing is to modify the processes so that the products will meet the Contract requirements.

The DBT will maintain a qualified and experienced Process Quality Control inspection and material sampling and testing staff. The IQF cannot provide the Process Quality Control Staff. The Process Quality Control staff will be certified as per Tables 2-2 and 2-3.

Process Quality Control staff will be qualified by formal education or training and experience in construction or craft supervision at the journeyman level. Each quality control specialist shall have a thorough understanding of the plans for the work, including any pertinent addenda, change orders, other contract documents, and the project specifications. The QMP shall describe the method to identify the individuals dedicated to performing quality control duties before starting work in the field. The DBT’s quality control staff may not be used to perform production work (including supervision).

2.6.1.9 Certifications and Accreditations

IQF personnel performing on-site inspection and material sampling and testing will have applicable certifications as listed in Tables 2-2 and 2-3.

Portable or satellite field laboratories will be AASHTO Materials Reference Laboratory accredited for the testing they perform.
The Department will perform quality assurance reviews on the IQF staff’s field performance and test results as part of the Department’s Quality Assurance responsibilities. The IQF will perform reviews of the inspection and test results and submit weekly summaries to the Department.

The QMP will specify procedures that:

A. Familiarize all personnel with all requirements of the Contract Documents pertaining to their responsibilities.
B. Educate, train, and certify (as appropriate) personnel performing activities affecting or measuring the quality of the Work, and ensure that they achieve and maintain reasonable proficiency.
C. Ensure that personnel performing the Work do so according to the QMP.

2.6.1.10 Removals
The Department will have the authority within their Department Independent Assurance and QA functions, to permanently remove from the Project any of the following:

A. A tester who does not perform the IQF or Process Quality Control tests in accordance with the test methods.
B. A tester who does not report test results accurately.
C. An inspector or geotechnical or environmental monitor who does not exercise good judgment in the performance of duty.
D. A tester or inspector who does not have the appropriate certifications, as per Table 2-2 and 2-3.

Table 2-2: Material Testing Personnel Certification Requirements

<table>
<thead>
<tr>
<th>Certifications Required For On-Site Material Sampling and Testing for:</th>
<th>Certification Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Concrete Sampling and Testing</td>
<td>Concrete Field Testing Technician – grade 1</td>
</tr>
<tr>
<td>Concrete Cylinder and Core Testing</td>
<td>Concrete Strength Testing Technician</td>
</tr>
<tr>
<td>Concrete Mix Design Testing</td>
<td>AASHTO AMRL Testing Laboratory</td>
</tr>
<tr>
<td>Aggregate Sampling</td>
<td>Ohio Level 1 Aggregate Technician</td>
</tr>
<tr>
<td>Basic Aggregate Testing</td>
<td>Ohio Level 2 Aggregate Technician</td>
</tr>
<tr>
<td>Aggregate Durability Testing</td>
<td>Ohio Level 3 Aggregate Technician</td>
</tr>
<tr>
<td>In Place Density Testing</td>
<td>NICET Level II, Construction Materials Testing – subfield Soils certification, and 2 years relevant experience</td>
</tr>
<tr>
<td>Asphalt plant sampling and testing</td>
<td>Ohio Asphalt level II</td>
</tr>
<tr>
<td>Asphalt mix design</td>
<td>Ohio Asphalt level III</td>
</tr>
</tbody>
</table>
Table 2-3: Inspection Personnel Certification Requirements

<table>
<thead>
<tr>
<th>Certifications Required for Field Inspector for:</th>
<th>NICET Level III, Highway Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC Paving and PCC Batch Plant</td>
<td>NICET Level II, Construction Materials Testing – subfield Soils certification, and 5 years relevant experience</td>
</tr>
<tr>
<td>Embankment</td>
<td>NICET Level II, Construction Materials Testing – subfield Soils certification, and 5 years relevant experience</td>
</tr>
<tr>
<td>Structural Concrete</td>
<td>NICET Level III, Highway Construction</td>
</tr>
<tr>
<td>Structural Steel Welding</td>
<td>AWS Certified Field Welding Inspector</td>
</tr>
<tr>
<td>Asphalt Paving</td>
<td>Completion of either NHI Course #131032, Hot-Mix Asphalt Construction or Asphalt Institute course, Construction of Quality Hot Mix Asphalt Pavements, and 5 yrs experience inspecting Asphalt using ODOT specifications</td>
</tr>
<tr>
<td>Prestressed Concrete</td>
<td>PCI level II and III</td>
</tr>
<tr>
<td>Post Tensioning Construction</td>
<td>PTI Bonded Post Tensioning Level II Certified</td>
</tr>
<tr>
<td>Post Tensioning Grouting</td>
<td>ASBI certified Grouting Technician</td>
</tr>
<tr>
<td>Bridge, Tower and Lighting Coating Application</td>
<td>ODOT bridge paint quality control specialist 514.04.A</td>
</tr>
<tr>
<td>Maintenance of Traffic</td>
<td>Worksite Traffic Control Supervisor (conforming to ODOT requirements)</td>
</tr>
<tr>
<td>Temporary Sediment and Erosion Control</td>
<td>CESSWI - Certified Erosion, Sediment, and Storm Water Inspector CPESC - Certified Professional in Erosion and Sediment Control</td>
</tr>
</tbody>
</table>

E. A designer who has their professional license suspended or revoked or loses their qualifications with the Department for the required design work.

F. Any IQF position that is not performing their functions in accordance with the QMP and the Contract requirements.

2.6.1.11 Staffing Levels
The staffing levels proposed in the Technical Proposal will be updated in the QMP and then updated, as necessary, during the course of the Project to reflect the actual construction schedule. With the exception of the key members, the size of the IQF staff will reflect the complexity, needs, shifts and composition of the construction activities consistent with the construction schedule, the relative locations of the Work to be covered, geotechnical considerations, environmentally sensitive areas, and the specific nature of the Work. The Department shall review and approve staffing levels presented within the QMP for adequacy in meeting Project needs.
2.6.2 QMP Section 2 - Administration Requirements
In general, QMP Section 2 (Administration) will describe the procedures for coordinating and ensuring the consistency and quality of all Work performed or provided for the Project by all participants.

2.6.2.1 Document Control
The QMP will specify procedures for meeting documentation requirements and document control for the filing of design criteria, reports and notes, calculations, plans, specifications, schematics, supporting materials, inspection, testing, construction material, etc., and for the specific responsibilities of personnel to satisfy these requirements.

All documents will be maintained by the DBT for the required duration according to The Department’s Records Retention Policy. Documents will be organized, indexed and delivered to the Department for Final Acceptance within five (5) business days of receipt of request from the Department. Any and all documentation will be available for review at any time by the Department and will conform to The Department’s manuals, policies, and procedures.

Documentation will be provided in formats acceptable to the Department. The Electronic documentation processes will conform to the Department’s requirements and will be of an acceptable and compatible with the Department’s IT systems.

A computer database of all soil, asphalt, aggregate, concrete and other materials testing from all groups (IQF Testing, Department Quality Assurance Testing, Process Quality Control Testing) will be provided, maintained, and updated on a daily basis. The electronic database must have the following capabilities:

A. Perform comprehensive statistical data analysis when statistical acceptance or comparison of materials is required by specifications (F & t tests, paired t, PWL, range, etc)
B. Allow multiple users input from multiple test groups (IQF, Department Quality Assurance Testing, Process Quality Control) and any other DBT or Department affiliated members
C. Track any changes made to the test data by some acceptable security and ownership system
D. Sort by multiple fields such as technician, station, etc.
E. Be capable of performing and evaluating statistical analysis on test data when statistical acceptance or comparison of materials is required by specifications
F. Be compatible with ODOT software and useable to ODOT after Project completion
G. Report to both the DBT and the Department

The QMP will identify (by name) document control supervisory personnel for the maintenance and management of records and documents pertinent to IQF activities. The Department will require electronic documentation for the Project.

2.6.2.2 Change Documentation
The QMP will specify measures to control the receipt and issuance of documents (such as instructions, procedures, drawings, and any changes thereto) that prescribe activities affecting quality. These measures will ensure that approved documents, including all authorized changes thereto, are reviewed for adequacy, approved for release by authorized personnel, and distributed to and used at the locations where the prescribed activity is performed. Changes to documents will be reviewed and approved by the same
organizations that performed the original review and approval, unless the Department allows, in writing, another responsible organization to perform such reviews and approvals.

2.6.2.3 Process Quality Control Audits
The QMP will specify a comprehensive series of planned periodic audits of the DBT’s Process Quality Control to determine the effectiveness of the Quality Program. A minimum of two audits per year will be conducted. Audits will be performed in accordance with the written procedures or checklists by appropriate trained personnel of the IQF. Audit results will be documented, reviewed and acted upon by DBT management having responsibility in the areas audited. Follow-up action, including re-audit of deficient areas, will be taken where indicated. Audits will be performed on the periodic schedule or when the Department determines the QMP is not effective. The Department will be notified and participate in the audits.

2.6.2.4 Design Changes
The QMP will specify procedures for tracking and distributing and obtaining approval of design changes made after the release-for-construction design drawings.

2.6.2.5 As-Constructed Drawings
The QMP will specify procedures to be used in preparation of the final as-constructed drawings to ensure accurate and timely documentation of the constructed Project. As-constructed drawings will be done as the Project progresses and each work element (buildable unit) is completed to ensure all parties are aware of any issues. Final submittal of complete as-constructed Drawings will conform to Section 2.6.4.12.

2.6.2.6 Scheduling
For each design item from the CPM schedule, or buildable unit segment, or construction phasing review, the DBT shall provide the Department the opportunity to be included in all design reviews. Through day-to-day communications, the DBT shall keep the Department up to date on the exact timing of all reviews and review processes. The DBT shall coordinate interim and final reviews in accordance with the agencies and review times listed in Section 2.6.4.9.

The schedule impacts of revisions required as a result of Contract non-compliance, including the Department’s time for reviewing revisions, will be borne by the DBT. Frequent and early coordination regarding resolution of previously identified issues is encouraged. Early agreement on issue resolution will eliminate or reduce significant design and construction impacts.

2.6.2.7 Minimum Documentation Requirements for Progress Payments
Progress payments will conform to the requirements of C&MS 109.09, as modified by the Proposal.

The QMP will specifically define how the IQF will both verify and document to the Department that the work shown on the cost-loaded CPM schedule has been completed or partially completed. At a minimum, the QMP will include progress payment verification and documentation procedures as indicated in the following paragraphs.

For design work, the QMP will establish verification procedures and documentation requirements that will show the Engineer the percentage of design work completed as compared to the CPM schedule. The
IQF will certify that any design work listed as 100% complete has been reviewed and approved by the IQF. The IQF will document any outstanding issues that would require rework and identify a revised percentage of completion based on these issues. The IQF will provide documentation to the Department supporting the percent complete of all design work.

For construction work, the quantity breakdowns provided by the DBT in their cost-loaded CPM schedule and verified by the IQF will be used to verify Work completed for a progress payment. The IQF verification will be based on their inspections, DBT quality control testing, IQF verification testing, and all project records associated with the quantity of Work submitted for a progress payment to the Engineer.

The Engineer will validate the DBT’s certification for progress payment by using IQF submittals and the Department's independent QA information. The Engineer will make the final determination regarding progress payments in accordance with CMS 109.09.

2.6.2.8 Project Progress Documentation
Section 2 of the QMP will indicate how the IQF will collect and retain each of the following types of data in written form during the performance of the Work, all of which will be in a form acceptable to the Department. At a minimum all documentation will conform to the Department’s Construction Inspection Manual of Procedures, construction inspection forms, and applicable standard procedures and provided in a format compatible with the construction management system employed for use with this project. This documentation will be made available to the Department daily throughout the project.

2.6.2.8.1 Material Sampling Tracking
The IQF will obtain and track manufacturer’s certificates and/or Department certification documents for all materials accepted by certifications or the Department’s TE-24 and QPL processes. The IQF will track, document the receipt of, and provide the Engineer, when required, with the copies of these documents and a breakdown of quantity of material, use of material, and location of materials. Manufacturer’s certifications will conform to the CMS 700 Material Details and other contract documents.

2.6.2.8.2 Quality Documentation
The IQF will review proposed progress payments to verify that acceptable quality documentation is on file for all payment items and to certify the required quality documentation is complete and/or document any issues to the Engineer in conformance with Section 2.6.2.7 and CMS 109.09.

2.6.2.8.3 Daily Manpower and Equipment Reports
The IQF will maintain daily contractor’s manpower and equipment reports for construction-related activities as well as each subcontractor.

2.6.2.8.4 Daily Occurrence Log
The IQF will prepare a Daily Occurrence Log of construction activities that will be maintained in narrative form and will document all significant occurrences on the Project, including:

A. Weather
B. Asserted Force Majeure events
C. Events and conditions causing or threatening to cause any significant delay, disruption, or interference with progress of Work
D. A general overview of the current Project activities including Maintenance of Traffic
E. Significant injuries to a person or property
F. A listing of all activities on the current Monthly Plan Update that are being actively prosecuted
G. A daily record (in a standard format) of all labor, materials, equipment and/or expenses incurred for each item of work and all IQF activities

2.6.2.8.5 Regulated Materials
For regulated material work, the IQF will maintain the data required by the contract, all laws and regulations. Records will be maintained separately for each site.

2.6.2.8.6 Utilities
The IQF will be responsible for oversight of coordination with utilities. Design, construction, rework, progress and protection during construction of utilities will be documented for use by the DBT and the Department. The data will be maintained separately for each individual utility facility.

2.6.2.8.7 Other Work
The IQF will maintain a separate Daily Occurrence Log for any project work not addressed in other sections of this document.

2.6.2.8.8 Specific Buildable Unit Segments of Work
The IQF will document all Buildable Units of Work as defined in the contract documents or in the accepted CPM schedule.

The minimum documentation requirements for actual construction will conform to the Department’s Construction Management System and the Construction Inspection Manual.

2.6.2.8.9 Quality Records
The IQF will document all quality, inspection and testing activities. This includes any delays encountered, work that does not conform to the requirements of the contract, and the corrective actions taken regarding such nonconforming work.

The minimum documentation requirements will conform to the Department’s Construction Management System and the Construction Inspection Manual.

2.6.2.8.10 IQF Monthly Certification
As part of the monthly progress report, the IQF will provide a written certification signed by the Independent Design Quality Manager and the Independent Construction Quality Manager, indicating that the QMP and all of the measures and procedures provided therein are functioning properly and are being fully complied with. This certification will be in addition to the requirements of CMS 109.09.

The IQF will also maintain and submit records weekly with evidence that all required activities and/or tests have been performed, including the following:
A. Type, number, and results of all current quality management activities, including reviews, inspections, material statistical analysis, tests, audits and monitoring of work performance
B. Closely related data, such as the qualifications of personnel and the procedures and equipment used
C. Identity of the inspector or data recorder, the type of test or observation employed, the results and acceptability of the work
D. Minutes of all QC and IQF meetings (distribute draft minutes within 48 hours)
E. The nature of any nonconforming work, causes for rejection, etc.
F. Proposed corrective action(s) for any nonconforming work, corrective action(s) taken and results of corrective action(s)

2.6.2.8.11 Materials and Equipment Conformance Record
The IQF will maintain documentary evidence that materials and equipment conform to the procurement requirements, and have it available at the jobsite at least 24 hours before installation or use of such material and equipment. When, due to the nature of the material (e.g., concrete), the 24-hour notification is impractical, a mutually agreeable timeframe will be determined. This agreement must be adopted 24 hours prior to the use of the material or equipment.

This documentary evidence will be retained at the jobsite and will be sufficient to identify specific requirements, such as all contract documents, codes, standards and specifications met by the purchased material and equipment. The effectiveness of the control of quality by the DBT's own forces and subcontractors will be assessed by the DBT at intervals consistent with the importance, complexity and quantity of the product or services, and will be verified by the IQF.

The Department reserves the right to inspect and review these documents at any time and requires submittals of all materials records, if not already provided, with any progress payment as evidence of all materials being approved.

2.6.2.8.12 Weekly Scheduling Notice to Department
The DBT shall notify the Department in writing by Thursday noon of each week of planned design and construction activities, including fabrication, for each Work activity segment for the following Monday through Sunday to allow the Department to schedule its resources. For activities (fabrication, etc.) occurring out of immediate project area (beyond 60 miles of the Project), the notification will be given at least 10 business days before the planned work.

2.6.2.8.13 Acceptance
At the completion of the Work, or if the Department grants a partial acceptance conforming to C&MS 109.11, the IQM will jointly conduct a final inspection with the Department and FHWA. Final acceptance will conform to C&MS 109.12 and will include, but not be limited to, associated as-built documents, certifications, other project documentation and DBT clean-up requirements. Inspection will be accomplished within five (5) working days of notification that the project or portion thereof, is ready for final or partial inspection as determined by the Engineer.

As part of a partial or final inspection, the Work will be examined and DBT quality control, IQF verification, and quality assurance documentation will be reviewed. The Department and the IQM will determine a punch list of nonconforming work. This punch list will be included in quality documentation
with an agreed date of correction for each deficiency. The IQF Manager shall verify that each deficiency has been corrected before the agreed completion date, provide all final documentation, and perform a final inspection with Department representatives to verify that the punch list deficiencies have been satisfactorily corrected.

2.6.8.14 Final Certification
At completion of the project, a certification signed by the DBT and IQM shall be submitted with the final invoice stipulating that all design, construction and materials incorporated in the project conform to the contract requirements.

2.6.2.8.15 Final Owner Acceptance
The Department has sole responsibility and authority for the final acceptance of all Work in accordance with CMS 109.12.

2.6.3 QMP Section 3 – Design Related Investigations and Testing Requirements
QMP Section 3 (Design related investigations and Testing) will:

A. Describe and define the procedures for ensuring the quality and documentation of project geotechnical investigations and testing.
B. Describe and define the procedures for ensuring the quality and documentation of field surveying for the project mapping coordinate system.
C. Provide assurance of qualifications of all laboratories performing any testing as part of the Design process.

2.6.4 QMP Section 4 - Design Requirements
In general, QMP Section 4 (Design) will describe design quality management practices and processes that are intended to:

A. Place responsibility for design quality on the DBT.
B. Ensure that Work is designed and built in accordance with the contract.
C. Ensure that all design documents are prepared in accordance with Department practices and meet all the requirements of the contract.
D. Ensure reviews are in compliance with the contract requirements and the accepted QMP.
E. Ensure that reviews of all design elements are completed and include all involved agencies (e.g., Department [District and Central office], FHWA, City of Columbus, utilities, etc.).
F. Allow the Department to fulfill its responsibility of exercising due diligence in overseeing the overall design process and design of individual buildable unit segments as defined by the cost loaded CPM schedule.

General submittal rules include:

A. Any partial design review submittal to the IQF and the Department, whether it aligns to the CPM’s cost loaded activity or buildable unit segment or not, will be a submittal that can be reviewed without having to make assumptions regarding how other portions of the project might
be designed. Any limited assumptions will be completely documented by the DB Designer and provided to the IQF and the Department.

B. If the IQF or the Department determines the submitted items are incomplete or assumptions are not sufficiently defined, the review will be cancelled and the costs and delays will be the responsibility of the DBT.

C. The IQF’s Design Oversight is responsible for the verification of the quality of the design elements of the project. The IQF's Design Oversight will oversee the verification of the design of the project by conducting design reviews, providing documentation and coordinating with the DBT and the Department to confirm and document that the design meets all requirements of the contract. The IQF staff performing design oversight must be employees of the IQF or the IQF’s design review consultant(s).

2.6.4.1 Quality Requirements
The QMP shall specify procedures for ensuring the quality of all design plans, specifications, reports, calculations, and other design and construction documents. These procedures will be formulated to ensure that appropriate quality requirements are specified and included in all design and construction documents, and that deviation from such requirements are controlled. For any deviations from these procedures, advance written approval shall be obtained from the Department.

2.6.4.2 Design Checks by the DBT Designer
The QMP shall specify quality procedures used by the DBT Designer for preparing and checking all plans, specifications, calculations, reports and other documentation. The DBT shall ensure that these documents are independently checked and back-checked in accordance with generally accepted engineering practices, Departmental policies and procedures, and Ohio and Federal Law. The DBT shall submit as part of the QMP, a listing of the DBT’s designers and checkers for each design portion of the project. The DBT shall assure that those personnel are qualified in accordance with Departmental policies and procedures and Ohio and Federal Law.

Specific procedures will be included demonstrating that any computer programs to be used, and the resultant output, are acceptable from an engineering perspective and conform to the contract’s design requirements.

The DBT shall define the process(es) and procedures that the Design Process Quality Control managers will employ to demonstrate that the QMP is understood and followed by the design personnel and the verification processes to assure the process(es) and procedures are followed. The design engineer and checker on all final design documents will be clearly identified.

The checking of structures and structural design will include independent calculations for all structural elements. The IQF shall not fill the checking engineer role.

2.6.4.3 Verification of Design Adequacy by the DBT Designer
The QMP shall specify the level, frequency, and methods of checking the design adequacy of the project, including the methods by which all design documents, calculations, and reports shall be independently checked, verified for adequacy of design, and back-checked in accordance with generally accepted design and engineering practices by senior experienced engineers from the DBT’s staff. This checking shall not be performed by the IQF.
2.6.4.4 **Design Coordination by the DBT Designer**
The QMP shall specify detailed procedures for coordinating work performed by different persons, firms, or disciplines on related tasks, in the same geographic area, or in adjacent geographic areas. These procedures will be formulated to ensure that, under such circumstances, no conflicts, omissions or misalignments occur between drawings or between the drawings and the specifications, and that the DBT coordinates the review, approval, release, distribution, and revision of documents. Such procedures could be an interdisciplinary review process, conflict identification process, omission identification process, etc.

2.6.4.5 **Unique Design Features**
The QMP shall specify those elements of the contract documents, design documents and construction documents that require special attention to or emphasis on quality, including applicable standards of quality or practice to be met, level of completeness, and/or level of detail required.

2.6.4.6 **DBT’s IQF review**
The Independent Design Quality Manager will review all designs to verify that development of the plans and specifications are in accordance with the requirements of the contract.

The IQF will have a documented, operative and effective Quality Program consistent with the approved QMP. At a minimum, all designs will be checked by a Senior Experienced Professional Engineer licensed in the State of Ohio.

2.6.4.7 **Participation**
The Designer of Record and the appropriate design manager(s) for the discipline(s) involved in the design (e.g., structures design manager, highway design manager, etc.) must be present for and participate in all reviews.

2.6.4.8 **Over-the-Shoulder Design Reviews**
The Independent Design Quality Manager will conduct over-the-shoulder design reviews. The Department will participate in these reviews. Involved utilities and City Departments may participate in these reviews and comment as requested or as otherwise deemed necessary by the Department. These over-the-shoulder reviews will be conducted in the project office of the Department, the DBT or its design engineer and in the presence of the design personnel, with the intent of minimizing disruption of ongoing design work. The Independent Design Quality Manager, design staff, and the Department will jointly determine the materials to be compiled for each review. Formal assembly and submittal of drawings or other documents will not be required, but the DBT is encouraged to provide informal submittals to facilitate reviews. The over-the-shoulder review may be of progress prints, computer images, draft documents, working calculations, draft specifications or reports, or other design documents. If mutually agreed upon for specific review items, the over-the-shoulder review may be facilitated by the transfer of electronic files. The IQF will document the conclusions of each over-the-shoulder review.

2.6.4.9 **Interim and Final Reviews**
The Independent Design Quality Manager will complete two (2) formal reviews, a formal interim (stage 1 detailed design review submission as a minimum per L&D manual volume 3 section 1403.7) and a final (100% complete) for each CPM defined buildable unit segment or DBT defined buildable unit segments.
The IQF will conduct interim and final reviews in accordance with the approved QMP. Each review will determine whether the Contract requirements and design criteria are being followed. In addition, the Independent Design Quality Manager will verify that there are no conflicts between the buildable unit being reviewed and any previously approved designs. All deviations from these requirements will be noted and corrected.

For each review, the DBT shall prepare a formal design submittal to all parties to include, at a minimum, design drawings, calculations (if required by scope), reports, specifications, geotechnical data, environmental requirements and any other relevant design information. Provide up to six (6) hard copies and one (1) electronic file (PDF format for reports and TIF format conforming to Department standards for the plans). Following the review and acceptance by the IQF, the DBT shall submit all formal design submissions to the Department during a submission meeting. At these submission meetings, which shall be scheduled by the DBT, the DBT shall provide an overview of the submittal, including a summary of all included information. The Department will not accept submissions with missing information. The review times, as noted in the Scope, shall only begin after submission acceptance by the Department. The review time frame listed in the scope shall commence on the next business day after acceptance by the Department. These design submission meetings can be waived at the Department’s discretion.

The Department, FHWA, all involved utilities and City of Columbus will be invited to attend these reviews. Schedule these reviews no sooner than the Agency review time allowances listed in Table 2-4 (not including weekends or state holidays) after all parties have received the submittals.

If utility or City of Columbus approvals are required per this scope or by permit, allow the following additional time in the schedule for review and comments/approvals:

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>REVIEW TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility company (including City of Columbus owned utilities)</td>
<td>Two (2) Weeks</td>
</tr>
<tr>
<td>City of Columbus Fire Department (Fire Alarm)</td>
<td>Four (4) Weeks</td>
</tr>
<tr>
<td>ODOT</td>
<td>Five (5) Business Days</td>
</tr>
</tbody>
</table>

When reviews by multiple agencies (e.g., Department, City of Columbus, utilities, etc.) are involved, the longest review time will control.

The Department reserves the right to waive interim reviews or shorten the review period based on the complexity of submission.

The Independent Design Quality Manager will prepare and distribute minutes of each review and will document that all review comments have been reviewed and addressed by the DB Designer, and that the IQF has verified all required revisions.

The IQF and/or DB Designer will seek concurrence from the Department prior to incorporating external agency (e.g., utilities, City of Columbus) review comments.
2.6.4.10 Interim and Final Review Content
The Department and City of Columbus manuals contain requirements for multiple design review submissions required as part of their Design Bid Build processes. All design information normally submitted as part of these design reviews must be submitted as part of an interim and/or final review for this project. However, the timing, packaging and grouping of this review information will be as indicated in the DBT-developed and Department-approved CPM schedule. At the request of the DBT, the Department may waive reviews that are not applicable in a DB environment.

In addition to the above requirements, the project scope may call for reviews of specific aspects of the project (e.g., Public Information Plan, Traffic Management Plan, etc.). Unless determined otherwise by the Department, these reviews are in addition to the interim and final reviews.

The final review submission shall include a written disposition of all comments made during the formal interim review.

2.6.4.11 Release-For-Construction Reviews and Quantities
Following the final review, the Independent Design Quality Manager will conduct and take minutes of all formal release-for-construction reviews. The DBT Designer will prepare a full set of drawings and accompanying documents stamped "Checked and Ready for Review." Following the review and acceptance by the IQF, the DBT shall submit all design submissions to the Department during a submission meeting. At these submission meetings, which shall be scheduled by the DBT, the DBT shall provide an overview of the submittal, including a summary of all included information and a disposition of all comments concerning the submission. The Department will not accept submissions with missing information. The review times, as noted in the Scope, shall only begin after submission acceptance by the Department. The review time frame listed in the scope shall commence on the next business day after acceptance by the Department. These design submission meetings can be waived at the Department’s discretion. Additional time for delays associated with the failure of the DBT to identify the proper review parties will not be recognized by the Department.

Provide up to six (6) hard copies and one (1) electronic file (PDF format for reports and PDF & TIF format conforming to Department standards for the plans).

The Independent Design Quality Manager will sign and stamp on the plans “Released for Construction” after the following requirements have been met:

A. All review comments have been resolved.
B. Plans have been designed in accordance with the contract requirements and correlate with the overall design.
C. Plans have been checked in accordance with the approved QMP.
D. No design exceptions exist that have not been approved by the Department.
E. Plans have been signed and sealed by the Designer of Record.

The DBT shall provide detailed quantity estimates for all Work covered by plans. The quantity estimates will be provided for the Department’s use and to facilitate quality sampling and testing (i.e., the units will be consistent with the units used to determine frequency of sampling and testing). For example, if the
number of compaction tests to be taken is based on a specific number of cubic yards of embankment, then the quantity estimate will also be in cubic yards.

2.6.4.12 Project As-Constructed Submittal
Before final project acceptance and after construction of the entire project is completed, the DBT shall prepare a formal design submittal for the entire project that includes all the updates to the final design such as any design changes, actual field as-built changes, actual survey info, etc. in both hard copy and electronic CADD format (conforming to Department CADD standards). The DBT shall identify all changes made to the final design.

2.6.4.13 Schedule Requirements
The DBT shall submit the proposed design and oversight review schedule and update monthly. The schedules will indicate the date and location of each review. The number of reviews in a given time period, especially if concurrent reviews are scheduled, will be coordinated with the IQF and the Department.

The following is the schedule order for design reviews:

A. Over-the–shoulder-reviews
B. Interim review
C. Over-the-shoulder-design reviews
D. Final review
E. Release-for-construction reviews

2.6.4.14 Design Review Documentation
The IQF will maintain a written record of all design reviews and oversight visits. The written record will:

A. List the participants in each review or visit.
B. Report all items discussed.
C. Identify discrepancies noted and report on corrective action(s) taken or planned.
D. Identify follow-up action items, due dates, and the responsible party.
E. Identify items needing resolution and time constraints for resolution.
F. Include the final results of all reviews.
G. Include all correspondence and review comments between the IQF and the DBT.

The IQF shall maintain daily manpower reports for design-related activities. The IQF shall provide reports at a frequency required by the Department’s Engineer.

The IQF shall maintain a record of internal quality activities. Internal quality activities will be summarized in monthly progress reports.

Reports of design reviews, over the shoulder design reviews and oversight visits will be submitted to the Department within three (3) working days of the completion of the review or visit and include plans reviewed, calculations, correspondence and review comments.
2.6.4.15 Acceptance of Design
Department acceptance of the design will occur at the time of acceptance of construction. The DBT will submit all documents required for final design approval, with a certification from the DBT and the IQF that the constructed Work has been built in conformance with the contract documents, design documents and the construction documents, and has been reviewed and approved by the Independent Design Quality Manager.

2.6.4.16 Design Changes

2.6.4.16.1 Initiation
Both the DBT and the Department may initiate design changes. Design changes may be made on items during or after design.

2.6.4.16.2 Reasons for Changes
Design changes can occur for several reasons, including, but not limited to, errors in the final design plans or specifications, unexpected or changed conditions in the field, scope changes, or design alternatives proposed by field or other personnel.

2.6.4.16.3 Validity
Requests for information (e.g., earthwork settlement releases, additional geotechnical information, additional alignment information, and dimensions) or design engineer evaluation of nonconforming constructed Work do not constitute valid design changes. (See Section 2.6.5.19 for the resolution process of non-conforming constructed work.)

2.6.4.16.4 Procedures
The QMP shall include a process to propose, receive, track, respond to and distribute design changes. In addition, the QMP shall identify the general goal, the participants, the participants’ responsibilities and a Work process for each change. The DBT shall request review by the IQF and the Department of all design changes. The IQF, the Department, and the DBT will jointly determine the procedures for reviews, with the mutual understanding that a timely and expeditious design change process benefits all parties.

For review of design changes, the DBT shall allow at least 20 working days (based on a five day workweek) after the plans or documents are received by the Department. Additional time will be allowed as listed in Section 2.6.4.9 when utility reviews are necessary.

2.6.4.16.5 Quality Checks
For all design changes, the DBT shall perform the same quality checks as were performed on the original design, and conform to all provisions of the Contract. No design change shall be made without first obtaining the written approval of the Department. All design changes, including but not limited to plans, sketches, memoranda, specifications, calculations, and reports shall be signed, sealed, and dated by a Professional Engineer licensed in Ohio.

In all cases, the Independent Design Quality Manager will certify in writing that the design change:

A. Has been designed in accordance with Contract requirements.
B. Has been checked in accordance with the approved QPM.
C. Is consistent with other elements of the original design.
D. Has been reviewed by the IQF and the Department and the Department has accepted the design change.
E. Is fully compatible with the design conditions as defined in Section 1.4.

2.6.4.16.6 Costs
The DBT shall bear all costs associated with making any change (initiated by either the DBT or the Department), unless a Change Order is issued amending the Contract value and the associated costs are approved by the Department.

2.6.4.16.7 Department Audits of Design Quality
The Department will audit, as needed, the Independent Design Quality Manager processes and design documents to verify compliance with the contract documents.

For any type of review, the Department reserves the right to continue its review of the design documents after the interim and/or final review meeting and to perform audits to verify compliance with contract requirements.

2.6.5 QMP Section 5 - Construction Requirements
In general, QMP Section 5 (Construction) will describe construction quality management requirements that are intended to:

A. Place responsibility for construction quality on the DBT.
B. Ensure that Work is constructed in accordance with the contract, plans, and specifications.
C. Allow the Department to fulfill its responsibilities of exercising due diligence in overseeing the construction.

2.6.5.1 Work Conditions
The QMP will specify procedures to ensure that all activities affecting the quality of the work will be accomplished under suitably controlled conditions, using appropriate equipment, and with assurance that all prerequisites to the proper accomplishment of a given task by a worker have been satisfied. These activities will be coordinated with the safety program specified in the DBT’s technical proposal.

2.6.5.2 Quality Procedures
The QMP will describe specific procedures to be followed to ensure that the Work conforms to all the requirements of the contract documents and the design documents being used as the basis for construction, and that all materials, equipment and elements of the Work which will be incorporated in the project will perform satisfactorily for the purpose intended. The QMP will specifically include the procedures for inspecting, sampling, testing, checking, documenting the Work (including all Work performed by subcontractors and utilities), and distribution of information (release for construction plans, design changes, nonconformance report remediation, etc) to all necessary parties.

2.6.5.3 Supplemental Information
The QMP shall specify that all activities undertaken that affect the quality of the Work will be prescribed by and performed in compliance with documented instructions, procedures, and/or drawings of a type appropriate to the circumstances. This supplemental information will include quantitative and/or qualitative criteria to determine whether all activities have been satisfactorily accomplished.
2.6.5.4 Purchased Materials
The QMP shall specify measures to ensure that purchased materials, equipment and services conform to the contract documents and the design documents. Measures will include provisions and the documentation procedures, as appropriate, for source evaluation and selection, objective evidence of quality furnished by subcontractors, inspection at the manufacture or vendor source, and examination of products upon delivery.

2.6.5.5 Material Identification
The QMP shall specify procedures that identify and control materials, equipment and elements of the Work to prevent the use of incorrect or defective materials and equipment. These procedures will ensure that identification of the item is maintained by appropriate means, on records traceable to the item, as necessary, throughout fabrication, erection, installation and use of the item. Material identification will include a direct relationship to the Department’s construction management system’s materials identification and tracking processes.

2.6.5.6 Inspection
The QMP shall include a program for inspection of all Work, including examinations, measurement, and tests of materials or elements for each Work operation where appropriate to verify quality. Such inspections will not be limited to that required for quality testing purposes. If the design documents specify mandatory inspection points that require witnessing or inspecting by the IQF, and beyond which work will not proceed without the approval of the Department, then the specific inspection points will be indicated in all appropriate documents. Mandatory inspection points will also be included to conform to the Department’s Construction Inspection manual, including forms and documentation.

2.6.5.7 Field Procedures
The QMP will specify procedures to address all elements that affect the quality in the production, placement and finishing of all construction items, including but not limited to roadway surfacing, paving, structural concrete, lighting, pavement markings, etc. These elements include, but are not limited to, the DBT management and process control personnel, testing equipment and laboratory facilities, testing frequencies, aggregate production, stockpile management, proportioning, mixing and processing, transporting, placing, spreading, depth or thickness, finishing, compaction, joint locations, and mix designs.

2.6.5.8 Dispute Resolution Laboratory
The QMP shall recommend a system to resolve disputes that may arise between IQF sampling and testing process for the IQF verification quality testing and the DBT’s quality control testing. If the recommended dispute resolution system involves a "dispute resolution laboratory," the name of a recommended laboratory must be included. The dispute resolution laboratory will not be a participant in the quality process of either the DBT or the Department and must be an accredited AASHTO Materials Reference Laboratory. The DBT is responsible for maintaining all materials for the dispute resolution laboratory. Dispute resolution processes will only evaluate if a result is or is not accurate. Dispute resolution processes that initiate additional testing without showing initial testing incorrect will not be acceptable.

When there is a dispute between either a quality control test result or IQF verification test result and the Department’s QA test result, the Department’s dispute resolution processes and non-specification materials policies will apply.

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2.6.5.9 Shop and Falsework Drawings
The QMP shall specify personnel assigned to shop drawing review and approval (including falsework drawings and other critical structure shop drawing); procedures for documenting reviews and approvals and for obtaining corrective action, when necessary; and procedures for checking compliance with shop drawing and falsework drawing requirements.

2.6.5.10 Plant Inspection
The QMP shall specify procedures for plant inspection for production of hot-mix asphalt, Portland cement concrete pavement, and structural concrete in addition to any Department requirements specified in the contract or construction and material specifications.

2.6.5.11 Test Procedures
The QMP shall include a program to ensure performance of all testing required to demonstrate that all materials, equipment and elements of the Work will perform satisfactorily for the purpose intended and meet the standards specified in the contract documents and design documents. The QMP will specify written test procedures for all tests that incorporate the requirements and acceptance limits contained in applicable design documents and which include provisions for verifying that all prerequisites for the given test have been met and that adequate test instrumentation is available and used. Where proposed test procedures differ from Department standards, the Department standards will be followed. The QMP will require test results to be documented and evaluated to verify that test requirements have been satisfied.

2.6.5.12 Equipment Certifications
The QMP shall specify measures to ensure that tools, gauges, instruments and other measuring and testing devices used in activities affecting quality are properly maintained, controlled, calibrated, certified and adjusted at specified periods to maintain accuracy within necessary limits.

2.6.5.13 Material Handling
The QMP shall specify procedures to control the handling, storage, shipping, cleaning and preservation of materials and equipment to prevent damage or deterioration.

2.6.5.14 Material Identification
The QMP shall specify procedures to indicate (by the use of markings such as stamps, tags, labels, routing cards or other suitable means) the status of inspections and tests performed upon individual items of the Work. To preclude inadvertent bypassing or duplication of such inspections and tests, these procedures will provide for the identification of items that have satisfactorily passed required inspections and tests.

2.6.5.15 Instrumentation
The QMP shall specify procedures and personnel to be used to ensure that specified instrumentation is installed, maintained and monitored in accordance with applicable specifications.

2.6.5.16 Coordination
The QMP shall set forth a program to coordinate inspections and testing by local agencies and utilities. The Department will be notified of all inspections and their results.
2.6.5.17 Laboratories
Laboratory Independent Quality Material Testing will be conducted by independent testing laboratories (not owned by or directly affiliated with the DBT) that comply with the requirements of the AASHTO Materials Reference Laboratory (AMRL) for applicable tests. Laboratories may be owned by or under contract to the IQF. AMRL accreditation will be obtained for all AASHTO and American Society for Testing and Materials (ASTM) test methods to be performed by the testing laboratory. Accreditation will also be obtained for AASHTO and ASTM test methods that are modified or referenced by Ohio test methods. A copy of AMRL accreditation certificate(s) will be submitted to the Department upon receipt by the testing laboratory.

Satellite (field) laboratories may be used where appropriate for the tests being conducted. Satellite laboratories shall be AMRL accredited before starting Work. The laboratory will have written policies and procedures to ensure that the satellite laboratories performing testing activities on the Project are capable of providing testing services in compliance with applicable test methods. The policies and procedures will address inspection and calibration of testing equipment as well as a correlation testing program between the accredited laboratory and portable or satellite facilities. Depending on the scope of the testing the satellite laboratory will be performing, the DBT may request the Department to waive the AMRL certification in lieu of some other equal certification.

2.6.5.18 Nonconforming Work
The IQF will identify, document and report all elements of the Work that have not, or are believed to have not, been constructed in accordance with the contract requirements. This reporting will be in the form of a nonconformance report and will be submitted to the IQM in writing within 24 hours of identification, with a copy sent to the DBT Designer, DBT Contractor and the Department.

2.6.5.19 Nonconformance Report Remediation
A nonconformance report will clearly describe the element of Work that is nonconforming and the reason for nonconformance. The Design Engineer who signed and sealed the drawings for the Work will evaluate and determine if a nonconformance exists, the effect of the nonconformance on performance, safety, durability, long-term maintenance and the life of the item. Remedial actions will be documented and bear the Ohio Professional Engineer’s stamp of the Designer of Record. The IQF must also sign the nonconformance report, stating that remedial actions to be employed have undergone the same level of inspection and testing as required for the original design.

The Department will be provided the nonconformance report remediation for review and acceptance by the Department. If the Department does not agree with the remedial actions set forth in a nonconformance report, it will have the authority to call for removal and replacement of the nonconforming Work at no cost to the Department.

2.6.5.20 Weekly Nonconformance Report Reports
The IQF will maintain a log of all nonconformance reports and submit it weekly to the Department. Each nonconformance report will be numbered sequentially, given a brief description and a status, and, if it is not closed, an expected date for closure. The Department shall not grant final acceptance for any portion of Work that has an outstanding nonconformance report.
2.6.5.21 Department Nonconformance Report
The Department will retain the right to write its own nonconformance reports based on its observance of Work, its quality assurance testing and its quality assurance verification of the QMP and quality control. Department-generated nonconformance reports require the same review and ultimate closure as nonconformance reports generated by the IQF.

2.6.5.22 Supplemental Drawing Procedures

2.6.5.22.1 Shop and Working Drawings
The DBT Designer will submit signed and sealed design drawings from which the DBT will then generate shop and working drawings as necessary to clearly define, control, construct and inspect the Work. The shop and working drawings will be sent back to the DBT Designer for review and internal approval. The timelines for the shop drawings preparation, review, and approval are the sole responsibility of the DBT.

2.6.5.22.2 Reviews by Local Agencies and Utilities
The Department and all other applicable local agencies that may require review of shop and working drawings will be consulted and assured that the DBT coordinates the preparation, submittal, and review of all such shop and working drawings. Where permits are required from utilities or local agencies, shop and working drawings will be submitted to them for review and approval in accordance with their specific requirements.

2.6.5.22.3 Public Safety
Shop and working drawings of Work elements that could adversely affect public health, welfare, or safety will be submitted to the Department and the local agency with jurisdiction for review and approval at the same time as they are submitted to the original design engineer for review and approval. Shop drawings, working drawings, and calculations for excavation shoring, cribs, cofferdams, falsework, overhead signs, temporary support systems, formwork and other temporary work that describe the methods of construction proposed to be used for the Work will be prepared and reviewed by the DBT. The Department will not review or regularly receive copies of these submittals unless it specifically requests so. However, the Department reserves the right to request copies of these submittals for audit purposes. All liability for temporary items used in the Work will lie with the DBT. The receipt of submittals for temporary work will in no way constitute approval of the planned work or acceptance of any liability by the Department.

2.6.5.22.4 Bridge Superstructure or Substructure Shop Drawings
The fabrication of any bridge superstructure or substructure elements will not commence without approved shop drawings or notification to the Department’s quality assurance inspection forces. Any procurement or fabrication of materials without approved shop drawings will be solely at the DBT’s own risk.

2.6.5.22.5 Shop Drawings
Shop drawings for permanent Work will include structural steel fabrication plans, prestressed concrete or precast concrete members, anchor bolt layouts, shop details, erection plans, equipment lists and any other information specifically required by the ODOT Standard Specifications or local agencies requirements when required in the contract documents. All shop drawings will be signed and sealed by a Professional
Engineer licensed in the State of Ohio, stamped "Approved for Construction," signed by the reviewer, and reviewed by the Independent Design Quality Manager prior to being considered approved.

All necessary approvals of shop and working drawings and copies of all approved drawings will be provided to the Department’s Engineer three (3) working days prior to the start of any on-site Work detailed by those drawings. For off-site fabrication, the approvals and drawings will be provided 14 working days in advance. No changes will be made to any approved shop or working drawing after they have been approved.

2.6.5.23 Survey Verification and Staking
The QMP will specify procedures for the IQF to follow in verifying the construction surveying, property surveying, establishment of right-of-way markers, as-built plans, re-established county and subdivision monuments, and record of survey map. This will include field verification of critical elements of the DBT-provided construction surveying.

2.6.5.24 Acceptance of IQF verification Testing
Testing of embankment and structural backfill compaction, gradations, and compaction of surfacing, pavement, structural components, concrete and other items requiring on-site acceptance tests will be performed by the IQF. Tests will be conducted in accordance with the requirements (location, frequency, lot sizes, test methods, etc.) of the C&MS, supplemental specifications and contract, and the results will be input into an electronic database. The IQF will also input the results of the Department Quality Assurance Testing and Process Quality Control Testing into the electronic database. Results of the IQF’s testing will be compared with the Department QA Testing. If the results of the Department’s QA sampling and testing validate the results and quality of the material, the material will be accepted. Initial IQF tests and Department QA Testing will be performed side-by-side to establish a confidence level between the results of IQF tests and Department QA Testing. The IQF firm will exercise sound judgment in its testing approach and will increase the frequency of testing in situations in which quantities may be small but location is critical.

2.6.5.24.1 Report Forms
All report form submissions shall use either a Department-approved standardized form for reporting test results or a form acceptable to the Department. Samples of the Department forms are on the Department’s Construction Management website.

2.6.5.25 Quality Checkpoints (QCPs)
QCPs will be established at certain stages of the construction process to ensure that only acceptable work is incorporated into the Project. As Work is accomplished, representatives of the DBT and the IQF, the Independent Construction Quality Manager, and the Department will review the progress to date, including inspection reports, process and acceptance test reports, settlement data, pile driving records, string-line measurements, audits, survey verification and other pertinent data. The IQF will coordinate the group members to ensure that the QCPs are accomplished timely. When a QCP is reached, the Department will respond within one working day of notification that all work has been completed for the checkpoint. Adequate time will be allowed to complete the QCP review before planning on proceeding with work past the QCP. Notifying the Department that the QCP has been reached when work is still ongoing or not allowing adequate time to complete the QCP review and make adjustments (i.e. the concrete truck waiting while still placing rebar while trying to conduct a QCP review), will result in a
Suspension of Work directive until the QCP is met. The IQF shall provide a courtesy notification of possible QCPs within the next 24 working hours to help facilitate the gathering of the necessary documents. The necessary documents to determine the acceptability of work (e.g., inspection reports, test reports, settlement data, nonconformance report remediation, etc.) will be provided by the IQF to all parties at the time of QCP notification. This group will come to a mutual agreement that the Work completed to date is acceptable and documented. The specified work item shall not proceed until this agreement is met.

QCPs will be established at the stages of construction listed below:

A. Earthwork:
   a. After all clearing, grubbing, and excavation to check subgrade or embankment foundations.
   b. At intervals of embankment construction of 20,000 cubic yards or 10 vertical feet, whichever occurs first (applicable to all embankments, including walls).
   c. After completion of MSE Wall panel placement every ten (10) vertical feet.

B. Structures:
   a. Before placement of the leveling pad of a mechanically stabilized earth (MSE) wall or other type of retaining wall (to confirm subgrade materials).
   b. At completion of bridge embankment settlement and before start of bridge foundation pile driving.
   c. At approval of pile driving submittals (including design calculations, wave analysis, hammer and dynamic load testing).
   d. After completion of pile driving at each structure support (pile group) (including pile-driving results and records).
   e. Before concrete placement of any substructure element, including piling and drilled shaft in-filling.
   f. After girder and diaphragm placement.
   g. Before concrete placement of deck, approach slabs, diaphragms and parapets.
   h. Before concrete placement of cast-in-place (CIP) retaining walls and box culverts (For CIP retaining walls and box culverts taller than six (6) vertical feet, the QCP will be after rebar placement but before final form placement).
   i. Before installation of post-tensioning cables into structural segments.
   j. At the completion of the first mass concrete pour.

C. Surfacing, Paving, and Concrete:
   a. Before placement of each course above subgrade on any permanent roadway components.
   b. Before placement of each lift of asphalt concrete or Portland cement concrete paving on any permanent roadway components.

D. Field Painting of Structural Steel:
   a. Follow QCP requirements as set forth under C&MS 514.

E. Maintenance of Traffic:
   a. At the end of each month, review Work Zone Traffic Control documentation for compliance and action.
2.6.6 **QMP Section 6 - Environmental Monitoring and Compliance Requirements**

QMP Section 6 (Environmental Compliance and Monitoring) shall describe the methods, processes and procedures to provide for the effective implementation and documentation of the environmental protection, training, compliance and monitoring program.

2.6.7 **QMP Section 7 - Maintenance of Public Facilities Requirements**

QMP Section 7 (Maintenance of Public Facilities) shall specify procedures to be followed in the maintenance of detours constructed on the project and off-site haul roads for controlling noise, dust and debris associated with the construction and hauling operations. Such procedures will provide the public with safe and effective alternative routes, as well as safe and convenient access to residences and businesses affected by construction activities.

2.6.8 **QMP Section 8 - Approvals**

The Construction and Materials Specifications (C&MS), Supplemental Specifications, Construction Inspection Manual of Procedures, and City of Columbus Specifications contain multiple references to “approvals by the Engineer” or similar language. The Department waives submittal requirements of the stated specifications that are addressed by the IQF in accordance with the approved QMP. The Department reserves the right to obtain and review these submissions in accordance with the Project Scope.

The QMP shall include a list of all “approved by” or similar language contained in the C&MS, Supplemental Specifications, Construction Inspection Manual of Procedures and City of Columbus Specifications along with the proposed responsibility (IQF or Department) for approval of each of the items. Waivers of approvals related to payments to the DBT will not be granted. The Department retains the authority to audit any IQF approvals.

2.6.9 **QMP Reimbursement**

All costs associated with this QPM shall be incidental to the appropriate item of work. These items of work will be identified in the DBT’s Cost Loaded Project Schedule and, upon receipt of all required documentation, reimbursed accordingly.
3 Document Management

The DBT shall be required to coordinate the various reporting and submission activities related to the requirements of the Project and Work within the framework established by the Department for document management.

Microsoft – SharePoint will support the electronic submission of all project related documentation. It will serve as a single point of reference all documentation related to this project.

Oracle Primavera – Contract Manager V13 will support the contract management process workflows for ongoing project management.

ODOT’s Construction Management System (CMS) is being replaced with Site-Manager for daily construction activities that will be recorded on-line remotely from construction field offices and from district and central offices. This system generates contractor estimates on request and passes that information onto accounting for payment purposes.

The awarded DBT must be able to use these software systems incorporating project tasks as outlined by ODOT in to their planned processes to ensure all required project documentation and submissions shall be compatible.
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4 Public Information and Communication

4.1 General

The DBT shall provide support services to the Department so that it can develop and maintain a consistent level of public communication, while encouraging broad public awareness and understanding of the Project.

Providing clear, consistent, and timely messaging is an essential element to successful Project delivery. To support the Department in this task, the DBT shall provide input for responses to public inquiries and complaints; assistance for media interaction; preparing regular traffic updates, press releases and information for web updates; photo and video documentation as requested; and information for coordination with local jurisdictions, transit providers, emergency services, and local neighborhood, community, and business groups. This support will permit the Department to share clear, concise, and timely information with the public, elected officials, community leaders, businesses, and the news media.

The DBT shall work with the Department to achieve the following public information and community relations goals:

A. Support the successful delivery of the Project.
B. Provide information to individuals and entities directly affected by construction in a proactive, responsive, timely and complete manner.
C. Reinforce positive ODOT relationships with associated agencies, individuals, and community groups.
D. Increase understanding of the importance of the Project and the overall I-70/I-71 South Innerbelt Reconstruction Project to the safety, mobility and economic vitality of the region and the State.

4.2 Performance Requirements

4.2.1 Communications

The preparation of Project public information by the DBT for the Department to disseminate requires the integration of resources and labor between the Department and the DBT. Communications will educate and inform the public, establish expectations, and play a significant role in delivering a successful Project.

4.2.2 Communications Planning Workshop and Construction Communications Public Information Plan (PIP)

The DBT shall submit a Draft Construction Communications Public Information Plan (PIP) in accordance with this Section, within 30 Calendar Days after Notice to Proceed. The content of the Final PIP will be agreed to during a communications planning workshop held within thirty (30) Calendar Days of submittal of the Draft PIP. The DBT shall organize and implement the workshop to include participation of the DBT’s Project Manager and communications staff, and the ODOT District 6 Public Information Officer and ODOT’s Project Manager. The Department shall invite staff from the City of Columbus to attend this workshop. The DBT shall develop a draft format and agenda for the workshop, and submit it to the
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Department for review and approval at least fourteen Calendar Days before the workshop. The location of the workshop shall be determined by the Department.

The Draft PIP shall serve as the basis for discussion at the workshop. The Draft PIP shall describe the Project's Communications Plan, and the critical role of the Communications Plan to the overall success of the Project. The Draft PIP shall also describe the Project approach to public involvement, public outreach, communications goals, and significant public relations risks and benefits. The Final PIP shall be the framework for communicating and disseminating information, and responding to public inquiries, comments, and requests. The Final PIP shall also include performance-monitoring processes and tools to be used by ODOT to assess the progress and measure the success of the DBT’s overall support of the communications efforts.

4.3 ODOT’s Communications Responsibilities

ODOT's District 6 Public Information Office will retain primary responsibility for the following communications tasks:

A. Responses to public comments regarding the Project.
B. Communications involving previous work associated with the I-70/I-71 South Innerbelt Environmental assessment and Finding of No Significant Impact, including issues such as noise analysis and mitigation.
C. Managing a project public contact database (e.g. Sharepoint, Extranet, etc.), including citizen requests for information. The DBT shall update this database with project-specific information, requests, and responses to inquiries.
D. Coordination with the Department’s executive and steering committees.
E. Media relations activities.
F. Managing the project web site.
G. Communications with local, regional and statewide elected officials.
H. Coordination with the DBT’s project staff and monitoring project communication support.

4.4 DBT’s Role in Public Information Efforts

The DBT shall assist the Department in identifying and implementing ways of informing the public, individual property owners, and broader communities about design and construction activities that directly affect them. The Department will be responsible for responding to all public information requests, with support from the DBT. The DBT shall provide input to the Department for responses to public inquiries within 48 hours of the Department’s request to the DBT.

The DBT shall participate in Project communications meetings between the Department and the DBT bi-weekly, and more often if determined necessary by the Department to maintain regular coordination on all public information goals and activities. In addition, the DBT shall participate in two region-wide ODOT communications meetings per year, as determined by the Department.
The DBT shall assist the Department with updates to the project public contact database with project-specific information requests. The Department will manage the database and will be responsible for providing responses to these information requests.

4.4.1 Public Information Staff

The DBT shall provide a full-time Public Information Specialist and additional staff as needed to support the Project. This staff is responsible for identifying public information issues related to the DBT’s Work, and for formulating strategies to address those issues. The Public Information Specialist will assist ODOT’s District 6 Public Information Officer to implement these strategies. The Public Information Specialist shall work with ODOT to maintain public satisfaction with the Project. The Public Information Specialist shall be available to the ODOT District 6 Public Information Office as necessary to respond to the communications needs of the Project. The Public Information Specialist shall be readily available by telephone during all business hours with immediate computer and email access. During critical construction activities and emergencies, the Public Information Specialist shall be available as necessary.

The Public Information Specialist shall have at least three years of recent experience coordinating information on public projects, preferably on large highway improvement projects. The Public Information Specialist's professional experience shall include the following:

A. Writing for the public, news media, and internet. Knowledge of and experience with the Department’s media relations protocols is preferred.

B. Providing and presenting information to the public, news reporters, community groups, and others.

C. Developing, implementing, and measuring the results of strategic communication plans and strategic messaging.

D. Developing and producing maps, charts, graphs, diagrams, and other visual images. Experience with the Department’s graphics standards is preferred.

E. Developing and implementing public involvement and community relations programs.

The Public Information Specialist shall have full access to all of the DBT’s Project details that may be relevant to the public, public agencies, emergency service providers, businesses, media, and other interested parties. The Public Information Specialist shall share information with ODOT continually throughout the Project.

The DBT shall provide the Department with a prioritized after-hours call list within 30 Calendar Days after Notice to Proceed. The call list shall include the contact information for the DBT’s public information staff, including home and mobile phone numbers, and e-mail addresses.

4.5 DBT Public Information Specifications

4.5.1 Meetings

The Public Information Specialist shall meet bi-weekly with the Department to maintain regular coordination and communication with ODOT on all public information goals and activities. Meetings
may include staff from the City of Columbus, as well as representatives from other key constituencies and other key stakeholders.

The Public Information Specialist shall meet with the ODOT staff more frequently, as directed by the Department, in the initial months of the Project to learn about Project specifics and expectations.

When requested by the Department, the Public Information Specialist shall also participate in weekly meetings to assist in the development and implementation of communications plans related to critical construction activities.

The DBT shall be available to participate in community meetings.

4.5.2 Traffic Congestion Mitigation Support
The DBT shall assist ODOT in coordinating with local stakeholders, including but not limited to the City of Columbus and the Mid-Ohio Regional Planning Commission, in an effort to develop a program for creative solutions for traffic congestion mitigation and associated publicity. The goal of this traffic congestion mitigation shall be to maximize the potential for transition of downtown Columbus commuting and traffic from peak hours to off-peak hours. Examples of ideas for such a program could include publicizing restaurants or other entertainment venues willing to offer discounts specifically aimed at retaining commuters past the PM traffic peak; free or discounted entertainment events; and publicity aimed at encouraging expanded use of public transportation.

Local stakeholders to be included in this effort shall be identified by the Department and communicated to the DBT. The DBT shall assist the Department to convene a minimum of one meeting with these stakeholders and shall submit to the Department a 'Traffic Congestion Mitigation Report' within 30 days of meeting with the local stakeholders, containing recommendations focused on minimizing traffic into and out of downtown Columbus during peak traffic hours. Implementation of the recommendations of this report will be as directed by the Department.

4.5.3 Weekly Progress Reports
The DBT shall provide a brief Weekly Progress Report to the Department. The Report shall summarize progress made the previous week and include photos of the previous week’s construction activities. Time-lapse photos shall be provided at locations determined by the Department at the Communications Planning Workshop. The DBT shall submit the Report by email every Monday to the ODOT District 6 Public Information Officer.

4.5.4 Construction Information Dissemination
The DBT shall coordinate with the Department to collect, write, and edit design and construction information for the Project Web site and other outlets. The DBT shall provide the Department with reader-friendly, clear and concise information. The DBT shall communicate with the designated ODOT Public Information Team weekly, and more frequently when requested by the Department, regarding planned and current construction activities using the Standardized Construction Maintenance Submittal Form provided by the Department. Information to be provided for current and planned construction activities include: location, estimated duration of activity, type of work being performed, physical impacts (e.g., lane closures, narrowed lanes, commercial vehicle restrictions), and planned construction detours.
4.5.5 Construction Schedule
One month prior to commencement of construction in any area of the Project, the DBT shall notify the Department of construction schedules. The Department will disseminate this information to the public. The DBT shall provide construction updates to the Department on a weekly basis. The DBT shall deliver additional updates if construction and traffic impacts change, or if the Department requests additional updates. These updates shall include the upcoming week’s planned closures, detours, Project status, and other information relevant to the public.

4.5.6 Crisis Communications Plan
The DBT shall include a Crisis Communications Plan (emergency response protocol) for responding to emergencies and incidents during the Project in its Draft PIP. The DBT shall coordinate this approach with the DBT’s overall Traffic Management Plan and Traffic Incident Management Plan. The DBT’s Crisis Communications Plan shall address the following:

A. Communications approaches to emergencies such as fire, gas line strikes, injured employees, auto accidents in a Work zone, and environmental spills;
B. Staff designated to respond to the emergency;
C. The cause of specific disruptions such as construction-related disruptions and weather;
D. Actions that could be taken to mitigate the crisis;
E. Procedures for notifying the Department, the public, and the DBT;
F. Any corrective procedures that will be put in place as a result of the crisis; and
G. Procedures for referring victims of auto damage due to construction to appropriate staff.

In the event of a crisis, the DBT shall summarize the emergency protocol used in an Emergency Incident Report, and submit that Report to the Department within three Calendar Days of the crisis.

Within 30 Calendar Days of Contract execution, the DBT shall schedule a crisis communications workshop with the Department to discuss protocols and potential emergency situations. The Department will invite the necessary staff from the City of Columbus and ODOT to the workshop.

Follow-up workshops will be held annually, and following any crisis situations, at ODOT’s discretion.

4.5.6.1 Dissemination of Emergency Information
As part of the Crisis Communications Plan, the DBT shall establish and manage an emergency response call list. All appropriate personnel shall be included on the call list for immediate response in the event of an emergency. The call list shall be divided into areas of expertise, so the proper people are contacted for specific emergency situations.

The following ODOT personnel shall be included on the call list for notification of all emergencies:

A. Project Engineer;
B. ODOT District 6 Public Information Officer; and
C. Columbus Traffic Operations Center.
The following DBT personnel, as a minimum, shall be included on the call list for notification of all emergencies:

A. DB Contractor Project Manager/Engineer;
B. DB Project Manager;
C. Work Zone Traffic Engineering Manager; and
D. Public information Specialist

The personnel on the call list shall be agreed upon at the communications planning workshop between ODOT and the DBT. At the communications planning workshop, ODOT and the DBT shall also agree upon appropriate staff from the City of Columbus to be included on the call list for notification of all emergencies. In addition, the DBT shall provide prompt information and assistance as requested by ODOT during an emergency.

4.5.7 Coordination with Traffic Management Plan
The DBT’s Public Information Specialist shall coordinate with Project staff to communicate construction traffic information to the Department for dissemination to the public and other affected parties. In addition, the DBT shall be responsible for coordinating traffic communications with neighboring construction projects, as part of an established coordinated communications plan. Refer to Section 16 Maintaining Traffic for additional traffic coordination requirements.

4.5.7.1 Maintenance of Traffic and Access
The DBT shall assist the Department in providing maintenance of traffic and access information for the entire Project to commuters, residents, and businesses, which are affected, at least two weeks prior to any revision to access in the area affected. Notifications shall include the following:

A. Purpose of the change;
B. Area affected and dates of impact;
C. Alternate routes and detours; and
D. A contact person for further information. The contact person shall be coordinated in advance with the Department.

4.5.7.2 Traffic Conditions
The DBT shall inform ODOT Project personnel of any unusual traffic conditions, such as road obstructions, within 15 minutes of detection.

4.5.7.3 Commercial Vehicle Access and Restriction Information
Fourteen calendar days prior to any activity taking place that may restrict or impede the movement of commercial vehicles due to reduced lane widths, reduced height clearances, or lower weight limits, the DBT shall coordinate with the Department and shall assist ODOT in providing the following agencies with a description, start date, and end date of the event:

A. City of Columbus Police Department;
B. ODOT District 6 – Permits;
C. Other – City of Columbus Fire Department, City school transportation, Central Ohio Transit Authority (COTA) etc., as deemed by ODOT to be appropriate.

4.5.7.4 Emergency Vehicle Access
The DBT shall assist the Department in developing a protocol for communicating information to the emergency service providers regarding access to the Project area for emergency vehicles. This protocol shall be included in the PIP.

4.6 Methods and tools for Dissemination of Information
The methods and tools listed in this section shall be employed by the DBT to disseminate information to the public in a timely fashion. In addition, the DBT is encouraged to incorporate further use of social media to enhance the ability to quickly notify the public of incident alerts or other construction change alerts. The DBT shall obtain approval from the District 6 Public Information Office before releasing project information to the public.

4.6.1 Highway Advisory Radio (HAR)
The DBT shall provide timely and accurate information daily or as requested by the Department for HAR messages. The DBT shall prepare draft messages for advance notice of traffic restrictions due to planned construction activities, for the Department to record.

4.6.2 Variable Message Signs (VMS)
The DBT shall prepare draft messages for advance notice of traffic restrictions due to planned construction activities.

4.6.3 www.pavingtheway.org
The DBT shall provide the ODOT District 6 Public Information Office with advance notice of traffic restrictions due to planned construction activities for posting on www.pavingtheway.org. This notice shall be provided at least 14 calendar days prior to implementation and include a description of the work being performed, the type of traffic restriction, alternative routes (if necessary), and the duration.

4.6.4 Telephone Hotline
The Department will establish and manage a telephone hotline for the Project. The DBT shall respond to any inquiries from the hotline within 24 hours, when requested by the Department. The DBT shall answer and respond to after-hours calls forwarded from the hotline. The DBT shall ensure that all staff responding to inquiries is trained, friendly, responsive, and informed about construction and traffic impacts. The DBT shall be responsible for compiling and summarizing questions and comments referred by the Department, from the general public. This includes tracking responses to callers, analyzing and reporting trends, and providing a weekly status report to the Department.

4.6.5 Collateral Materials
In addition to the dissemination of construction information discussed in this Section, the DBT shall, upon request from the Department, assist the Department with producing written materials regarding construction issues specific to the Project, which may include, but are not limited to, schedule, noise, lights, and fugitive dust. the Department shall be responsible for making these materials available to the
public as requested through U.S. mail, e-mail, the Department’s Web site, and at individual and group meetings.

The Department shall determine when materials shall be distributed to businesses and neighborhoods; the size of the distribution area; and the content of the materials.

4.6.6 Correspondence and E-Mail
The Department will forward e-mail, letters, and other forms of correspondence from the public regarding design and construction issues to the DBT for response. The DBT shall assist the Department in providing responses to correspondence; however the Department shall be responsible for responding to all correspondence.

The DBT shall forward to ODOT all requests the DBT receives for project related information via telephone, e-mail and letters from the public within 24 hours of the request. Project-related correspondence shall include communications from the public, businesses, community groups, and government entities affected by the Project.

4.6.7 Open Houses, Special Events, Public Meetings, and Speaking Engagements
The DBT shall assist the Department in convening one public open house per year to inform the public of the Project’s status, and to answer questions related to the Project. The DBT is encouraged to work with the Department to develop alternate approaches to open houses that actively engage and inform as many people as possible.

The DBT shall assist with outreach to community groups, including but not limited to, local jurisdictions, neighborhoods, businesses, truckers, shippers, transit agencies, employee transportation coordinators, and environmental groups. The DBT shall be available to attend public and community meetings or to make presentations, at the Department’s request. The DBT shall attend at a minimum ten public and community meetings, and shall assist the Department in coordinating and presenting information at a minimum of forty additional community meetings per year.

4.6.8 Photographs and Video
The DBT shall assist the Department in providing documentation of construction, public outreach, and other Project-related events using photographs and video. The documentation shall be used for public communications, media relations, and the Department archival purposes. All photographs and video taken by the DBT in support of the Department’s documentation of the Project shall be provided to ODOT by the DBT.

4.6.9 Events
The DBT shall coordinate, communicate, and provide a plan to minimize construction impacts for public events held by public and private entities. ODOT shall develop and maintain a list of public events, which will be updated weekly and communicated with the DBT. Examples of public events include, but are not limited to: Ohio State University sporting events; Nationwide Arena sporting events and concerts; Columbus Convention Center events, etc.

The DBT shall notify ODOT of planned events that may be affected by construction 14 calendar days before the event takes place.
4.6.10 Media Relations
Although media relations are the responsibility of ODOT, the DBT shall participate in media interviews or other media information support activities at ODOT’s request. When participating in media inquiries and interviews, the DBT shall provide information that complies with ODOT messaging and other standards, including requirements for advance Project information, Project progress and accountability, and timely response to media inquiries.

The DBT shall coordinate all media requests with ODOT prior to interviews. ODOT will be the media spokesperson. The DBT shall provide ODOT with information and access to key Project staff for press interviews, as requested. At ODOT’s request, the DBT shall conduct tours of the Project site for media, local or State government officials, or ODOT management. The DBT shall provide information and materials that meet local broadcast and print media requirements and deadlines. All information released to the news media must first be reviewed and approved by ODOT prior to release.

4.6.11 Ground Breaking and Ribbon Cutting Events
ODOT shall be responsible for conducting ground-breaking and ribbon cutting events. The DBT shall assist ODOT with the planning and preparation of these events (exhibits, signs, invitations, etc.). ODOT will provide the DBT with a list of authorities to be invited to these events.

4.6.12 Project Tours
ODOT anticipates potential interest from public groups and individuals for tours of the Project site during construction. The DBT shall work with ODOT’s project staff to develop a plan, at the outset of the Project, to coordinate regular public tours of the Project site. The plan shall include consideration for appropriate public safety and shall be designed to result in minimal impact to the contractor’s field activities. The plan shall be revised if ODOT deems that demand during construction is substantially different from what was anticipated in the original plan.

4.7 Utility Interruptions
The DBT shall conduct regular communication with residents and businesses affected by utility interruptions. The DBT shall contact and provide written notification to all residents and businesses affected 48 hours in advance of a utility interruption, and shall maintain a record of each notification. Notices shall indicate the purpose and expected duration of the interruption, and provide information indicating how those affected by the interruption can contact the DBT. Notices shall meet ODOT’s communications style and be pre-approved by ODOT before dissemination. Such notices may also be provided by ODOT.

The paragraph above applies only to utility interruptions that are a result of contractor work activities. It does not apply to interruptions conducted by and coordinated by the utilities.

In the event of an emergency involving a utility interruption, the DBT shall notify the utility owner in accordance with utility company standards and local emergency services.
4.8 Construction Traffic Mitigation

The DBT shall collaborate with ODOT's District 6 Public Information Officer on opportunities to work with transportation coordinators, transit agencies, local chambers of commerce, sports teams, retail centers, businesses, communities, and others, to encourage more efficient use of highways and roadways. The DBT shall work with the ODOT District 6 Public Information Officer on marketing plans to contact these entities, and to keep them informed of construction activities. The DBT shall participate in meetings with the ODOT District 6 Public Information Officer and with ODOT construction mitigation staff, as required.

4.9 Quality Assurance and Quality Control

The DBT shall maintain a high level of quality control for all public information tools and materials. The DBT shall be bound by the provisions of the Quality Management Plan for all public information. The PIP shall outline a process for managing review and resolution of comments for all communications materials, both within the DBT’s team and with ODOT. ODOT will provide the DBT with periodic feedback and suggestions for improvement. The DBT shall be responsible for implementing any changes required by ODOT.

4.10 Submittals

Project submittals include, but are not limited to, the following:

A. Project Contact Call List – Submitted within 30 Calendar Days of Contract execution;
B. Communications planning workshop date and draft agenda within 30 Calendar Days from the date of the executed contract between the DBT and the Department;
C. Weekly Progress Reports – Format to be established within 30 Calendar Days from the date of the executed contract between the DBT and the Department, with reporting beginning immediately thereafter;
D. Draft and Final PIPs;
E. Construction Information;
F. Emergency Response Protocol;
G. Project Identification Signs;
H. Telephone Hotline Information; and
I. Photos and videos.
**4.11 Outreach to the Disadvantaged Enterprise Business Community**

The DBT shall employ a Diversity and Inclusion Consultant familiar with the Disadvantaged Business Enterprise (DBE) Community in the area to specifically communicate employment opportunities, consulting opportunities, and materials supply opportunities. This consultant should have experience with the DBE program and dealing with DBE eligibility and certification issues. The consultant should develop innovative and aggressive strategies to attract and retain a diverse pool of vendors, consultant and suppliers for the project’s procurement opportunities, and to recruit potential DBEs eligible for certification. The DBT shall report outreach progress and results at least quarterly. The Diversity and Inclusion Consultants are to coordinate their outreach activities with ODOT’s staff and/or consultants.

The intent of this provision is to assist the DBT in achieving the project specific DBE goal and to increase capacity of the DBE community.
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5 Environmental Commitments

5.1 Permitting Requirements

The DBT shall construct the project in accordance with any and all applicable permits required for performing such work. This includes the permits described in the scope and any additional permits needed that are not specifically identified in the scope.

If not already obtained by the Department, the DBT shall obtain all necessary permits and pay all charges, fees and taxes associated with these permits. The DBT shall be responsible for any fines levied by regulatory agencies as a result of their construction activities or non-compliance with any permit special or general conditions.

5.1.1 Waterway Permits

The DBT shall confirm that Section 404/401 Permit and/or Water Quality Certification requirements do not apply to the project. At no time shall the DBT coordinate waterway permit issues directly with the permitting agencies unless directed to do so by the Department’s Office of Environmental Services (OES).

5.1.2 National Pollutant Discharge Elimination System (NPDES) Permit

The DBT shall minimize water sedimentation impacts through the use of Best Management Practices for soil erosion and sedimentation control. All temporary sediment and erosion control shall be the responsibility of the DBT. Refer to the Department’s SS832 (modified), located in Appendix GN-03, for developing the Storm Water Pollution Prevention Plan (SWPPP) and locating, furnishing, installing, and maintaining temporary sediment and erosion control. The SWPPP shall be in place prior to the initiation of any earth disturbing activity.

All temporary sediment and erosion control work and the SWPPP shall be according to the modified SS832 found in Appendix GN-03. For information about OEPA’s NPDES permit requirements see http://www.epa.state.oh.us/dsw/storm/index.html.

The Department shall submit a Notice of Intent (NOI) to OEPA for the project. The DBT is required to be a co-permittee. Earth disturbing activity is not permitted prior to the OEPA issuance of a Facility Permit Number and fully executed co-permittee form.

5.1.3 Removal of Temporary Erosion Control Items

The DBT shall remove all temporary erosion control items before the project is accepted. Removed temporary erosion control items become the property of the DBT. Dispose of removed temporary erosion control items in accordance with the appropriate CMS specifications.

5.1.4 Floodplain Impacts

Prior to construction of any and all drainage structures in a floodplain, the DBT shall submit a letter identifying any temporary or permanent impacts to the floodplain to the Department for review and comment. If necessary, the Department shall coordinate with the local floodplain coordinator for agreement.
5.2 **Noise Walls**
This project does not include construction of any noise walls (See Section 13: Noise Walls).

5.3 **Construction Noise**
The DBT shall also coordinate monthly with the representatives of Shiloh Baptist Church and St. Paul AME Church in order determine the schedule of noise sensitive events at those historic sites and the DBT shall minimize construction noise during those times. (See Section 1.11: Construction Noise). The construction noise mitigation identified in the Construction Noise Analysis (See Appendix GN-02) and listed in Section 1.11 shall be used to minimize construction noise during sensitive events at Shiloh Baptist Church and St. Paul AME Church.

5.4 **Construction Vibration**
See Section 8.3.5: Vibration Monitoring and Control Requirements.

5.5 **Section 106/Historic Sites**
The DBT is required to comply with all stipulations of the Memorandum of Agreement (Agreement Number: 14242) which was executed August 1, 2007 and the First Amendment to the Memorandum of Agreement (Agreement Number: 14913) which was executed July 18, 2008 between the Federal Highway Administration, The Advisory Council on Historic Preservation, The Ohio State Historic Preservation Office, and the Ohio Department of Transportation regarding the Federal-Aid Highway Improvement of Interstate Route 70 in central Columbus, Franklin County, Ohio FRA-70-8.93: PID 77369, Agreement Numbers 14242 and 14913 (See Appendix EN-01).

In accordance with these agreements, the DBT shall include the following which minimize effects on nearby historic properties:

A. Ft. Hayes Campus – No right-of-way shall be acquired from the parcels containing the Ft. Hayes campus. No construction activity or construction staging shall occur on the parcels containing the Ft. Hayes campus. In order to protect the existing stone wall/fence associated with the Ft. Hayes campus, the DBT shall not work or in any way disturb the area north of the curb line of Jack Gibbs Boulevard in the vicinity of the wall/fence.

B. St. Paul AME Church– No right-of-way shall be acquired from the parcel containing the St. Paul AME Church. No construction activity or construction staging shall occur on the parcel containing the St. Paul AME Church. See Section 8.3.5 Vibration Monitoring and Control Requirements and Section 1.11 Construction Noise.

C. Shiloh Baptist Church – No additional right-of-way shall be acquired from the parcel containing the Shiloh Baptist Church. Except within the identified temporary construction easement, no construction activity or construction staging shall occur on the parcel containing the Shiloh Baptist Church. See Section 8.3.5 Vibration Monitoring and Control Requirements and Section 1.11 Construction Noise.
D. Jefferson Avenue Historic District – Construction activity shall be limited to the portions of Long Street and Lester Drive outside the district boundaries. No construction staging shall occur within the district boundaries. Access shall be maintained to the developed portions of the district at all times during project construction.

E. Hamilton Park Historic District – Construction activity shall be limited to the portions of Long Street outside the district boundaries. No construction staging shall occur within the district boundaries. Access shall be maintained to the developed portions of the district at all times during project construction.

F. Aesthetic treatments and designs including but not limited to landscaping and streetscaping shall be incorporated into the final design (see Section 14). Aesthetic treatments shall complement adjacent historic properties. The Ohio State Historic Preservation Office and Section 106 consulting parties shall be provided an opportunity to review and comment on these designs. All comments shall be forwarded to the Department for consideration.

G. If archeological sites or human remains are discovered, cease all work in the immediate area and notify the Department who shall immediately contact the Office of Environmental Services – Cultural Resource Section (614-466-7100). In the event human remains are discovered, the DBT shall also contact local law enforcement and the Franklin County Coroner.

The detour routes listed in Sections 16.7, 16.8, and 16.9 have been approved by the Department relative to Section 106 sites and historic districts. Any modification to these detour routes, or use of other detour routes must be approved by the Department’s Office of Environmental Services – Cultural Resource Section. The Independent Quality Firm (IQF) shall confirm that any comments provided by the Department’s Office of Environmental Services – Cultural Resource Section have been addressed prior to the implementation of any detour routes.

5.6 Public Information
The DBT shall coordinate with the Department so that all detour routes and provisions for local access are clearly posted in advance of project construction. (See Section 4: Public Information)

5.7 Indiana Bat Habitat
If trees exhibiting suitable Indiana bat habitat must be cut, the DBT shall coordinate with the Department’s Office of Environmental Services to determine if surveys are warranted. The DBT shall cut any potential Indiana bat roost trees between September 30 and April 1.

5.8 Environmental Commitments Summary Table

<table>
<thead>
<tr>
<th>SECTION</th>
<th>REFERENCE</th>
<th>COMMITMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.1</td>
<td>Clean Water Act</td>
<td>DBT shall confirm that Section 404/401 Permit and Water Quality Certification requirements do not apply</td>
</tr>
<tr>
<td>SECTION</td>
<td>REFERENCE</td>
<td>COMMITMENT</td>
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<tr>
<td>5.1.2</td>
<td>Clean Water Act</td>
<td>DBT shall develop a SWPPP</td>
</tr>
<tr>
<td>5.1.2</td>
<td>Clean Water Act</td>
<td>DBT shall not conduct any earth disturbing activity prior to the OEPA issuance of a Facility Permit Number and fully executed co-permittee form</td>
</tr>
<tr>
<td>5.1.4</td>
<td>FEMA Flood Insurance Program</td>
<td>DBT shall submit a letter identifying any temporary or permanent impacts to the floodplain to the Department</td>
</tr>
<tr>
<td>5.3</td>
<td>Section 106 MOA</td>
<td>DBT shall coordinate monthly with the representatives of Shiloh Baptist Church and St. Paul AME Church in order to determine the schedule of noise sensitive events at those historic sites and the DBT minimize construction noise during those times.</td>
</tr>
<tr>
<td>5.3</td>
<td>Section 106 MOA</td>
<td>The construction noise mitigation identified in the Construction Noise Analysis (See Appendix GN-02) and listed in Section 1.11 shall be used to minimize construction noise during sensitive events at Shiloh Baptist Church and St. Paul AME Church.</td>
</tr>
<tr>
<td>5.4</td>
<td>ODOT Construction and Material Specifications</td>
<td>DBT shall control and monitor vibrations when performing demolition and construction activities near buildings, structures, or utilities that may be subject to damage from construction induced ground vibrations.</td>
</tr>
<tr>
<td>5.4</td>
<td>ODOT Construction and Material Specifications</td>
<td>Vibration control and monitoring shall conform to Item 208 of the Department’s Construction and Material Specifications except as modified in Section 8.3.5.</td>
</tr>
<tr>
<td>5.4</td>
<td>ODOT Construction and Material Specifications</td>
<td>DBT shall conduct a pre-construction survey of any buildings, structures, and utilities located within limits determined by the DBT’s vibration specialist.</td>
</tr>
<tr>
<td>5.4</td>
<td>ODOT Construction and Material Specifications</td>
<td>DBT is responsible for any damage resulting from demolition and construction activities.</td>
</tr>
<tr>
<td>5.5</td>
<td>Section 106 MOA</td>
<td>DBT shall not allow any construction activity or construction staging within the boundaries of the Jefferson Avenue Historic District or the Hamilton Park Historic District.</td>
</tr>
<tr>
<td>5.5</td>
<td>Section 106 MOA</td>
<td>The implementation of any detour routes or closures than those listed in Sections 16.7, 16.8, and 16.9 is not permitted without prior approval of the conceptual Maintenance of Traffic plan by the Department’s Office of Environmental Services – Cultural Resource Section (614-466-7100).</td>
</tr>
<tr>
<td>SECTION</td>
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</tr>
<tr>
<td>5.5</td>
<td>Section 106 MOA</td>
<td>DBT is required to comply with the Memorandum of Agreement (Agreement Number: 14242) and the First Amendment to the Memorandum of Agreement (Agreement Number: 14913). See Appendix EN-01</td>
</tr>
<tr>
<td>5.5</td>
<td>Section 106 MOA</td>
<td>DBT shall not acquire any additional right-of-way from the parcels containing the Shiloh Baptist Church, St. Paul AME Church, or the Ft. Hayes campus.</td>
</tr>
<tr>
<td>5.5</td>
<td>Section 106 MOA</td>
<td>DBT shall not work or in any way disturb the area north of the curb line of Jack Gibbs Boulevard in the vicinity of the existing stone wall/fence associated with the Ft. Hayes campus.</td>
</tr>
<tr>
<td>5.5</td>
<td>Section 106 MOA</td>
<td>DBT shall not allow any construction activity or construction staging on the parcels containing Shiloh Baptist Church, St. Paul AME Church, or the Ft. Hayes campus, except within the identified temporary construction easement at Shiloh Baptist Church.</td>
</tr>
<tr>
<td>5.5</td>
<td>Section 106 MOA</td>
<td>If archeological sites or human remains are discovered, the DBT shall cease all work in the immediate area and notify the Department who shall immediately contact the Office of Environmental Services – Cultural Resource Section (614-466-7100).</td>
</tr>
<tr>
<td>5.5</td>
<td>Section 106 MOA</td>
<td>In the event human remains are discovered, the DBT shall contact local law enforcement and the Franklin County Coroner.</td>
</tr>
<tr>
<td>5.6</td>
<td>FHWA FONSI</td>
<td>DBT shall coordinate with the Department so that all detour routes and provisions for local access are clearly posted in advance of project construction.</td>
</tr>
<tr>
<td>5.7</td>
<td>FHWA FONSI</td>
<td>DBT shall coordinate with the Department’s Office of Environmental Services to determine if surveys are warranted when trees exhibiting suitable Indiana bat habitat must be cut.</td>
</tr>
<tr>
<td>5.7</td>
<td>FHWA FONSI</td>
<td>DBT shall ensure that any potential Indiana bat roost trees shall only be cut between September 30 and April 1.</td>
</tr>
</tbody>
</table>
5.6 & Sec 16 Environmental Reevaluation No. 1 for Project 1

The impacts to the I-670 paved facility will be kept to a minimum. The project will not impair the overall continuity of the transportation facility nor change its attributes and function.

All Maintenance-of-Traffic (MOT) plans will accommodate pedestrian/bicycle traffic.

If construction related closure of Leonard Avenue will exceed 14 days, designated pedestrian/bicycle detours will be provided.

5.9 NOTIFICATION OF DEMOLITION AND RENOVATION OF STRUCTURES

The Structures on the project have been tested for Asbestos and no Asbestos has been found. The DBT is required to review the report (Appendix EN-06) and complete and file with the OEPA the OHIO ENVIRONMENTAL PROTECTION AGENCY - NOTIFICATION OF DEMOLITION AND RENOVATION forms (Appendix EN-07) 10 days of prior to demolition.

If demolition activities uncover any materials that were not identified/evaluated and are found to contain Regulated Asbestos Containing Material (RACM), work should stop on the specific structure and the area isolated until the applicable materials can be assessed by an Asbestos Hazard Evaluation Specialist (AHES). Further, abatement of (RACM) identified must be conducted by an asbestos abatement contractor who is licensed by the State of Ohio.
6 Utilities

6.1 General

The DBT shall be responsible for coordination with the owners of all utility facilities affected by the project. The resolution of any conflicts between the owners of the affected utility facilities and the construction of the project shall be the responsibility of the DBT.

A. Any required relocation of public utility facilities shall be included in the DBT’s bid and schedule. (This work includes, but not limited to, relocation of City of Columbus Division of Power and Water (Power), City of Columbus Division of Power and Water (Water), City of Columbus Division of Telecommunications and City of Columbus Division of Sewerage and Drainage facilities).

B. The Department has initiated coordination efforts with specific private utility companies having known conflicts with this project. Copies of the Memoranda of Understanding (MOU) with each private utility are provided in Appendix UT-17 for reference. The DBT shall be responsible for coordination with the private utility facility owners as described in this scope.

C. The DBT is responsible for all coordination and schedule risk for relocation of privately owned utility facilities, except as described in Section 6.4.2 Deadlines and Delays.

D. The DBT shall submit a listing of all utility facilities required to be relocated by the DBT’s proposed work as part of the technical proposal. The Department will score proposals on the DBT’s efforts to minimize schedule and cost risks associated with relocation of utility facilities.

The Department will make all determinations of compensable rights related to utility facility design, relocation, modification and construction. Except as specifically indicated in the contract documents, no additional compensation or time will be granted for any delays, inconveniences, or damages sustained by the DBT due to interference from utility facilities or utility facility relocations.

6.2 Governing Regulations for Utility Design and Construction

Any utility relocation work performed by the DBT shall be consistent with the Department’s utility relocation process. This work shall also be consistent with the utility owner’s written specifications, standards of practice and construction methods, as well as any applicable Department, Ohio Environmental Protection Agency (OEPA), and/or City of Columbus permit and plan approval requirements.

Plans developed by the DBT for the design of the utility relocation and/or as part of the project shall also include at a minimum the following information: other proposed work (roadway, structures, etc.), existing topography, right-of-way, lanes of travel and the location of the utilities. When the DBT develops utility relocation plans, these plans shall be subject to review by the Independent Quality Firm (IQF), the Department, the City of Columbus and the involved utility, as applicable.

Section 1.14 identifies specifications related to the design, construction and owner’s submittal and record drawing requirements for underground water lines, storm sewers and sanitary sewers. All utility design, relocation, modification and construction shall be performed in accordance with these specifications.
the event of a conflict among the standards listed in Section 1.14 related to design, construction, modification or relocation of publicly owned utilities (City of Columbus DOPW(Power), DOPW(Water), Telecommunications and DOSD), the City of Columbus standards shall take precedence. In the event of a conflict among the standards listed in Section 1.14 related to design, construction, modification or relocation of privately owned utilities and accepted industry standards, the most restrictive standard shall take precedence.

6.3 Utility Contacts

The following named utility owners maintain and operate utility facilities within the project limits. Currently available contact information is provided for each.

Electric:

American Electric Power – Transmission (AEP)
(Private Utility - Investor Owned)
Attn: Tina Hairston
700 Morrison Road
Gahanna, OH 43230
614-552-1801
614-552-1818 FAX
tlhairston@aep.com

American Electric Power – Distribution (AEP)
(Private Utility - Investor Owned)
Attn: Paul Paxton
850 Tech Center Drive
Gahanna, OH 43230-6605
614-883-6831
614-883-6868 FAX
ptpaxton@aep.com

City of Columbus
Division of Power and Water (Power) (DOPW(Power))
/Public Utility – Publically Owned/
Attn: Robert Schneider
3500 Indianola Avenue
Columbus, OH 43214
614-645-7534
614-645-5814 FAX
rschneider@columbus.gov
Natural Gas:
   Columbia Gas of Ohio
   (Private Utility - Investor Owned)
   Attn: Jon Amstutz
   1600 Dublin Road
   Columbus, OH  43215
   614-481-1056
   jamstutz@niscourse.com

Water:
   City of Columbus
   Division of Power and Water (Water) (DOPW(Water))
   (Public Utility – Publically Owned)
   Attn: Joe Clouse or Bob Arnold
   910 Dublin Road
   Columbus, OH  43215
   614-645-7677
   614-645-6165  FAX
   ddpettenski@columbus.gov

Cable:
   Time Warner Cable
   (Private Utility - Investor Owned)
   Attn: Terry Allen
   3760 Interchange Drive
   Columbus, OH  43204
   614-255-6349
   terry.allen@twcable.com

Sewer:
   City of Columbus
   Division of Sewerage and Drainage (DOSD)
   (Public Utility – Publically Owned)
   Attn: Robert C. Herr, PE
   1250 Fairwood Avenue
   Columbus, OH  43206-3371
   614-645-0483
   614-645-0888  FAX
   rcherr@columbus.gov

Signals:
   The DBT shall coordinate with the Department as per Chapter 15.
ITS:
The DBT shall coordinate with the Department as per Chapter 15.

Lighting:
The DBT shall coordinate with the Department as per Chapter 15.

Telephone/Telecommunications:

AT&T
(Private Utility - Investor Owned)
Attn: Tom Ziomek
111 North Fourth Street
Columbus, OH 43215
614-223-7162
614-223-4105 FAX
Tz7315@att.com

City of Columbus
Division of Telecommunications
(Public Utility – Publically Owned)
Attn: Dave McNally
90 West Broad Street – Room 316
Columbus, OH 43215-9006
614-645-1501
dwmcnally@columbus.gov

City of Columbus
Division of Communications
(Public Utility – Publically Owned)
Attn: Marcellas Stewart
220 Greenlawn Avenue
Columbus, OH 43223
614-645-7345 Ext. 124
mgstewart@columbus.gov

6.4 Utility Coordination

Known relocations are identified in Section 6.8. Additional relocations shall be identified by the DBT. The DBT shall design the project to minimize the scope and extent of additional relocations, where possible. When relocations are necessary, coordination of these relocations with the involved utility shall be the responsibility of the DBT.
Only those utility facilities immediately affected by the proposed construction shall be relocated or adjusted. If the DBT desires the temporary or permanent adjustment or relocation of the utilities for their benefit, they shall conduct all negotiations with the utility owners and pay all associated costs. The DBT shall assume all schedule impacts from these relocations and/or adjustments.

The DBT shall:

A. Identify and contact the owners of all utilities within the project area to verify the nature, extent and location of their existing facilities
B. Identifying all impacted utility facilities resulting from the Step 7 Engineering Plans (see Appendix RD-03) and DBT developed plans
C. Provide all project construction plans, SUE and geotechnical information to these utilities
D. Coordinate all work with the affected utility owners
E. Schedule and conduct coordination meetings during design and construction
F. Design all utility relocations and/or adjustments to be compatible with future I-70/I-71 South Innerbelt contract groups.

The DBT shall be responsible for maintaining and updating the Utility Conflict Matrices to reflect their design. The Utility Conflict Matrices shall be updated, at least monthly, by the DBT as necessary during the course of plan development. The DBT shall make their updated matrices available to affected utility owners, the Department’s District Utility Coordinator, Project Manager and Engineer.

The DBT shall establish a schedule of utility coordination meetings commensurate with the complexity of each utility’s relocation issues. The DBT shall notify the Department District 6 Utility Coordinator at least three (3) working days in advance of each of the meetings. The Department District 6 Utility Coordinator will participate as necessary. The DBT is responsible for keeping meeting minutes and providing this documentation to the Department within two (2) working days following each meeting.

The DBT shall copy the Department’s District Utility Coordinator, Project Manager and Engineer on all correspondence related to utility facilities.

See Appendix UT-04 for flowcharts providing guidance on utility facility relocations identified after contract award.

6.4.1 Scheduling of Utility Relocation Work

The DBT shall confirm the relocation plan preparation, review and approval and construction timeframes required by the utility owner and incorporate these timeframes into the project’s CPM schedule.

The DBT shall consider special scheduling requirements of utilities, such as peak load periods (e.g., winter gas loads and summer electric loads) when developing their CPM schedule.

The DBT shall pay all costs incurred by the utility owner associated with the use of DBT proposed construction acceleration methods, (e.g., the use of overtime or subcontractors). These acceleration costs are NOT eligible for reimbursement by the Department.
When the DBT prepares a utility facility relocation plan, the utility owner will review and approve/reject the design prepared by the DBT no later than 10 working days after its submission to the utility owner, unless a different time period is agreed to by both parties. If a utility owner rejects any design work, the DBT shall immediately notify the Department, in writing, of the grounds for rejection and suggestions for correcting the problem. The DBT shall correct the design and resubmit to the utility owner for review. The review of the corrected design is anticipated to take 5 working days.

When the utility owner prepares a utility facility relocation plan, the Department, the DBT, and IQF review the design and/or permit application to ensure that the relocation does not interfere with other proposed construction activities, including relocations of other utility facilities. This review shall be completed no later than 10 working days after its submission to the DBT, unless a different time period is expressly agreed to by both parties. The DBT shall compile and provide written review comments to the Department and the utility owner.

The DBT shall be responsible for inspection of private utility relocation to ensure that the relocation does not interfere with other proposed construction activities, including relocations of other utility facilities.

### 6.4.2 Deadlines and Delays

The DBT shall be responsible for monitoring utility facility relocations including plan development, plan review, and construction. The DBT shall promptly notify the Department if a utility facility owner is not complying with the agreed upon time frames indicated in Section 6.4.1. If the DBT provides documentation confirming that a utility has failed to relocate their facilities in a timely manner, an Obstruction Removal Notice will be issued by the Department or the City of Columbus, as appropriate. The Department will not be responsible for payment of delay claims associated with utility coordination/relocation, unless the DBT is able to provide the Department with sufficient documentation for an Obstruction Removal Notice.

### 6.4.3 Changes to the Utility Work

Once a utility relocation has begun, the DBT shall not make any changes to the proposed project design which would necessitate a second relocation of the utility facility. However, the DBT may make changes if they agree to absorb the schedule impact and provide full compensation for 100 percent of all costs (design and construction) associated with the second relocation to the utility company. If this is the case, the DBT shall provide the Department with documentation of their agreement with the involved utility.

### 6.4.4 Utility Owner to Perform Inspections

The utility owner may perform inspections of construction of any utility work that is performed by the DBT on their facility. The DBT shall give sufficient notice (at least two (2) working days) to the utility owner prior to relocating their facility to allow for scheduled inspections. The DBT shall notify the Department of any such inspections. The DBT shall provide the Department with written documentation of all utility comments and their resolution. The DBT shall provide safe access and any necessary traffic control for any utility work inspections performed by the utility owner.

### 6.4.5 Reimbursement Process

If a utility company notifies the DBT that they believe any utility relocation work is reimbursable (to the utility), the DBT shall immediately notify the Department. The Department will determine compensable interest for reimbursement.
6.4.6 Continuity of Utility Service

The DBT shall ensure that all utilities remain operational during all phases of project construction to the greatest extent practicable. Necessary interruptions of service, including proposals for shutdowns and temporary diversions of affected utilities, shall be approved by the involved utility. The DBT is directed to Section 4.7 for notification requirements of disruptions in service.

Where the DBT is responsible for the performance of utility relocation work, in order to maintain the service continuity of the utility owner’s facilities to the extent practicable during that performance of work, the DBT, at its cost, shall:

A. Keep the utility owner fully informed of schedules, including coordinating with the utility owner with regard to their design, construction and inspection of utility work performed by the DBT.
B. Keep the utility owner fully informed of changes that affect their facilities.
C. Keep the utility owner involved in making the decisions that affect their facilities so the utility owner is able to provide uninterrupted service to its customers, or be subject to the least interruption practicable.

All the utility owner’s facilities shall remain fully operational during all phases of project construction, except as specifically allowed and approved by the utility owner.

6.5 Existing Utility Locations

6.5.1 Underground Utilities

Existing publicly and privately owned underground utility facilities within the project area are tentatively located and identified in the Step 7 Engineering Plans contained in Appendix RD-03. Locations, sizes and depths (when indicated) have been compiled as follows:

- Non-gravity underground utility facilities (water, gas, electric, etc.) have been located to SUE Quality Level “B” within the project area. Appendix UT-19 shows the limits of the Level “B” SUE locates.
- Generally, storm sewers and sanitary sewers outside the I-71 and I-670 mainline freeway have been located by field survey. Appendix UT-19 shows limits of storm sewers and sanitary sewers located using this method.
- Generally, storm sewers and sanitary sewers within the I-71 and I-670 mainline freeway have not been surveyed and are shown based on record construction plan information. Appendix UT-19 shows limits of storm sewers and sanitary sewers located using this method.

The DBT is advised that the locations, sizes and depths portrayed in the Step 7 Engineering Plans should be considered approximate. The DBT is responsible for final verification of all subsurface utility facility locations, both public and private, and coordination of any necessary relocations within the limits of their work.

6.5.2 Overhead Utilities

Existing publicly and privately owned overhead utility poles and towers within the project area are tentatively located and identified in the Step 7 Engineering Plans contained in Appendix RD-03. Locations have been compiled by a combination of efforts including reviewing existing facility plans and
field survey, however, the DBT is advised that these locations should be considered approximate. The DBT is responsible for final verification of all overhead utility facility locations including type, number and elevation of lines, and related above ground facilities, both public and private, and coordination of any necessary relocations within the confines of their work.

### 6.6 Known Underground Utility Conflicts

Currently identified underground utility facility conflicts within the project limits are tabulated in the Identified Utility Impacts Matrices contained in Appendices UT-01, UT-02 and UT-03. The matrices will be maintained and updated by the Department through the bidding process. The matrices as provided by the Department at that time shall be considered tentative and subject to final verification by the DBT. Additional conflicts shall be identified by the DBT as a result of: chosen substructure unit locations; retaining wall construction; roadway and pavement construction; excavation and embankment limits; changes to the design resulting from Alternative Technical Concepts (ATCs); DBT selected construction means and methods; and other construction operations. Per Section 6.4, the DBT shall be responsible for maintaining and updating the Identified Utility Impact Matrices to reflect their design after the project has been awarded.

### 6.7 Protection of Utility Facilities

The DBT shall coordinate project construction with utility adjustments and take all necessary precautions to prevent disturbance to existing utility facilities.

The DBT shall perform work in a manner that will cause the least reasonable inconvenience to the utility owner and those being served by the utility owner. Existing, adjusted, or new utility facilities that are to remain within the right-of-way of the project shall be properly protected by the DBT to prevent disturbance or damage resulting from project construction operations. If the DBT encounters an unknown utility that requires adjustment, they shall not disturb the utility and shall take the proper precautions to protect the facility or take appropriate actions, per the contract documents, to coordinate the adjustment of the facilities.

The utility plans identified are record plans, not as-built drawings, and should be considered for reference only.

#### 6.7.1 Existing Utility Facilities That Shall Not be Impacted by the Proposed Work

Several existing utility facilities have been identified by their respective owners as unable to be relocated, adjusted or modified in any fashion as a result of the proposed construction. Currently known facilities falling into this category are listed in the Identified Utility Conflict Matrices in Appendices UT-01, UT-02 and UT-03.

##### 6.7.1.1 American Electric Power - Transmission (AEP)

AEP Transmission maintains one (1) 138 kV oil-cooled transmission line that crosses under I-670 just east of St. Clair Avenue. The DBT’s proposed construction shall not impact this facility. Refer to Appendix UT-07 for record plans and Appendix UT-05 for Level “A” test hole information.
6.7.1.2 American Electric Power – Distribution (AEP)
AEP Distribution maintains overhead facilities on pole lines along the east side of Cleveland Avenue, along the south side of Jack Gibbs Boulevard and along the south side of Long Street. The pole lines in these locations are known conflicts with the Step 7 Engineering Plans (See Appendices RD-03 and RD-04) and will be relocated in advance of this project by AEP forces. The DBT’s proposed construction shall not impact the relocated distribution facilities at any of these locations. Refer to Appendix UT-06 for relocation plans.

AEP Distribution also provides service to Shiloh Baptist Church from an existing pole line between the Church and I-71. The DBT’s proposed construction shall not permanently impact these poles. The facilities attached to these poles may be temporarily supported and/or relocated as necessary, but service to Shiloh Baptist Church shall at no time be interrupted.

6.7.1.3 AT&T
AT&T maintains an existing conduit system crossing under I-670 just west of Cleveland Avenue. The DBT’s proposed construction shall not impact this facility. Refer to Appendix UT-08 for record plans and Appendix UT-05 for Level “A” test hole information.

AT&T also maintains an existing 12-conduit system under Long Street that crosses I-71 on the Long Street bridge. This system is a known conflict with the Step 7 Engineering Plans (See Appendix RD-03) and will be relocated to the new AEP pole identified is Section 6.7.1.2 by AT&T forces. This relocated system is to remain in service during construction. The DBT’s proposed construction shall not impact the relocated AT&T facilities. AT&T will relocate this facility into proposed conduits on the Long Street bridge (See Section 6.9.2) after the construction of the bridge is complete.

AT&T has existing underground asbestos cement conduits that require abatement on each side of the existing Long Street structure. The DBT will co-ordinate the closure of Long St with AT&T. AT&T will remove and abate the existing asbestos conduit and install split duct on the existing cables during the Long St closure, as required. The abatement will be on each side of the structure from the existing structure to the project work limits. AT&T expects their abatement and relocation contractors to have one week of work for each side of the structure. The asbestos cement conduit on the existing structure was previously abated.

AT&T also provides service to Shiloh Baptist Church from an existing pole line between the Church and I-71. The DBT’s proposed construction shall not permanently impact these poles. The facilities attached to these poles may be temporarily supported and/or relocated as necessary, but service to Shiloh Baptist Church shall at no time be interrupted.

6.7.1.4 Time Warner Cable
Time Warner Cable maintains existing overhead facilities attached to the existing AEP Distribution pole line and the existing I-670 bridge abutment along the east side of Cleveland Avenue. The AEP pole line is a known conflict with the Step 7 Engineering Plans (See Appendix RD-03) and will be removed. The Time Warner Cable facilities attached to this pole line will be relocated in advance of the project by Time Warner forces. The DBT’s proposed construction shall not impact the relocated Time Warner facilities. Refer to Appendix UT-16 for relocation plans.
Time Warner Cable also maintains an overhead facility on the existing AEP pole line along the south side of Jack Gibbs Boulevard. The AEP pole line is known conflict with the Step 7 Engineering Plans (see Appendices RD-03 and RD-04) and will be relocated. The Time Warner Cable facilities attached to this pole line will be relocated in advance of the project by Time Warner forces. The DBT’s proposed construction shall not impact the relocated Time Warner facilities.

6.7.1.5 City of Columbus Division of Power and Water (Power)
The City of Columbus Division of Power and Water (Power) provides power to the existing traffic signal at the Leonard Avenue and St. Clair Avenue intersection from a pair of poles on the northwest corner of the intersection. The DBT’s proposed construction shall not impact these poles. The poles may be supported as necessary, but power service to the existing signal shall at no time be interrupted.

6.7.1.6 City of Columbus Division of Power and Water (Water)
The City of Columbus Division of Power and Water (Water) maintains an existing 8” water line at Grove Street that provides service to Shiloh Baptist Church through a 2” service line and a 4” service line. The DBT’s proposed construction shall not impact the 8” water line or the service lines. Record plans are provided in Appendix UT-11.

The City of Columbus Division of Power and Water (Water) also maintains an existing 20” waterline at Cleveland Avenue. The DBT’s proposed construction shall not impact the existing 20” water line. Refer to Appendix UT-05 for Level “A” test hole information.

The City of Columbus Division of Power and Water (Water) also maintains an existing 12” water line at Mt. Vernon Ave. that crosses under I-71 and an 8” water line off of this 12” water line that extends north between I-71 and Shiloh Baptist Church. These water lines have been abandoned by the recent construction of a new 12”/6” water line and are no longer in service. There are no restrictions when working around the abandoned water lines. The new 12”/6” water line at Mt. Vernon Avenue shall not be impacted by the DBT’s proposed construction. Record plans for the 12”/6” water line and the abandoned 12” and 8” water lines are provided in Appendix UT-11.

6.7.1.7 Columbia Gas of Ohio
Columbia Gas of Ohio maintains an existing 10” gas line at Cleveland Avenue. The DBT’s proposed construction shall not impact the existing 10” gas line. Refer to Appendix UT-05 for Level “A” test hole information.

6.8 Known Utility Facility Relocations
All utility relocations shall be completed within existing right-of-way.

6.8.1 Existing Utility Facilities to be Relocated by the Proposed Work
Several utility facilities have been identified to be relocated as part of the proposed construction. Currently known facilities falling into this category are identified and described below. These facilities are also identified in the Identified Utility Conflict Matrices in Appendices UT-01, UT-02 and UT-03.

6.8.1.1 City of Columbus Division of Power and Water (Power)
The City of Columbus Division of Power and Water (Power) maintains three (3) overhead 15-kV circuits crossing I-71 on a series of poles along the north side of the Spring Street bridge. It will be necessary to
relocate these circuits to avoid conflicts with the proposed bridge, cap and roadway work at this location. The DBT shall reconfigure these circuits temporarily overhead by reconductoring an existing overhead circuit and construction of a new section of circuit with 4/0 bare copper or the functional equivalent as follows. Reconductor existing circuit along Walnut Street from Grant Ave. to Washington Ave. (approximately 1150 feet), then north along Washington Ave. to the end of the existing circuit (approximately 525 feet). Construct new pole line and conductors on Washington Ave. from the end of the existing circuit north of Town Street to Capital Alley (approximately 750 feet). Reconductor existing circuit on Capital Alley from Washington Ave. east to Parsons Ave. (approximately 1550 feet). DOPW(Power) then can temporarily refeed circuits so the DBT can remove the three circuits crossing I-71 at Spring Street during construction. The DBT shall relocate these three circuits underground within the project limits. The underground relocation will require each of the three circuits to have its own set of riser poles, one on each side of I-71. All conductor cable shall be replaced “in kind” or functional equivalent. These circuits may be permenantly relocated on the Spring Street Structure if these conduits are relocated within an inner bay. The relocations shall meet all applicable requirements of the City of Columbus DOPW(Power) (See Appendix UT-10), the Ohio Department of Transportation Utilities Manual and the National Electric Safety Code.

The City of Columbus Division of Power and Water (Power) also maintains an existing overhead 15kV circuit crossing of the I-71/I-670 Interchange from Jack Gibbs Boulevard on the west to E.A. Parham Street on the east. It will be necessary to relocate this circuit to avoid conflicts with proposed work within the interchange. The DBT shall maintain an energized line across I-71/I-670 during construction. This can be accomplished with the installation of a temporary or the permanent line. The existing poles on either end of the main span are in conflict with proposed roadways and there are potential vertical clearance conflicts with proposed bridges. The DBT has the option to relocate this circuit either overhead or underground. Regardless of the relocation option selected, all conductor cable shall be replaced “in kind” or functional equivalent. The relocations shall meet all applicable requirements of the City of Columbus DOPW(Power) (See Appendix UT-10), the Ohio Department of Transportation Utilities Manual and the National Electric Safety Code, with the exception that the required vertical clearance shall be 25’, as opposed to 16.5’.

The City of Columbus DOPW(Power) will make the final connections. The DBT shall co-ordinate the final connections and tie-ins with the DOPW(Power). Provide a minimum of three weeks notice.

6.8.1.2 City of Columbus Division of Power and Water (Water)

The City of Columbus Division of Power and Water (Water) maintains an existing 24” water line crossing under I-71 just south of the Long Street Bridge. It will be necessary to relocate this water line to avoid conflicts with the proposed bridge and caps at this location. Requirements for the design and construction of the 24” water line are provided in Appendix UT-18.

Refer to Appendix UT-11 for record plans for the existing 24” water line.

The City of Columbus Division of Power and Water (Water) also maintains an existing 12” water line beneath Jack Gibbs Boulevard crossing I-71. This line is currently inactive and may either be removed or abandoned as part of this project. If the line is removed or abandoned it will be necessary to cut and plug the line east of the existing pressure boundary valve. The existing boundary valve may be relocated as necessary to avoid conflicts with proposed retaining walls. All work performed on City of Columbus
water lines shall meet the requirements of the City of Columbus CMS. Refer to Appendix UT-11 for details on this existing water line and boundary valve.

City of Columbus Standard Drawings for proposed water line work are provided in Appendix UT-12.

6.8.1.3 City of Columbus Division of Telecommunications
The City of Columbus Division of Telecommunications maintains an aerial facility along the east side of Cleveland Avenue that is attached to existing utility poles owned by AEP. It will be necessary to relocate this facility in order to widen Cleveland Avenue as shown in the Step 7 Engineering Plans. This facility shall be designed and constructed by the DBT to be relocated underground and meet the design requirements of the City of Columbus Division of Telecommunications, as detailed in Appendix UT-15.

The City of Columbus Division of Telecommunications maintains an aerial facility along the south side of Jack Gibbs Blvd. that is attached to existing utility poles owned by AEP. It will be necessary to relocate this facility in order to widen Jack Gibbs Blvd. for the proposed parking lane shown in Appendix RD-04. This facility shall be designed and constructed by the DBT to be relocated to new utility poles installed along the south side of Jack Gibbs Blvd. by AEP. The DBTs design shall meet the design requirements of the City of Columbus Division of Telecommunications, as detailed in Appendix UT-15.

The City of Columbus Division of Telecommunications also maintains an aerial facility along the south side of Long Street that spans across I-71, attached to utility poles owned by AEP. It will be necessary to relocate the City’s telecommunications facilities in order to accommodate the proposed Long St. bridge, caps and associated roadway work at this location. The relocated City telecommunications facilities shall be designed and constructed by the DBT to meet the requirements of the City of Columbus Division of Telecommunications, as detailed in Appendix UT-15. The DBT will be required to remove the existing utility poles after completing the necessary relocations. At no time shall these facilities be out of service. The relocated telecommunications facilities may be relocated on the bridge deck in conjunction with City of Columbus Traffic conduit, as proposed in Section 15.2.11.1.

6.8.1.4 City of Columbus Division of Sewerage and Drainage
The City of Columbus Division of Sewerage and Drainage maintains an existing 42” sanitary siphon system crossing I-71 just south of Long Street. Record plans for the existing siphon system are located in Appendix UT-13.

It will be necessary to relocate the siphon system to avoid conflicts with the proposed bridge, caps and roadways at this location. A detailed scope of work and specifications for performing the sanitary sewer siphon relocation is provided in Appendix UT-14. Refer to Section 2 for plan review requirements.

Pressure testing of the siphon as required per City of Columbus CM&S 901.20 may be performed in partial segments to facilitate phased construction. Individually completed portions shall be tested as they are constructed. In addition, the entire system as a whole shall be tested once completed. Consideration for the encasement must be given and the joints of the encasement shall be properly reinforced. The design submitted by the DBT for the siphon shall include a reinforcement detail for the encasement at the phase change location which complies with the encasement design requirements.

The City of Columbus Division of Sewerage and Drainage maintains facilities throughout the project area. Refer to Section 11 for coordination details and design requirements.
6.8.1.5 Columbia Gas of Ohio
Columbia Gas of Ohio maintains an existing 12” gas line that crosses east-west through the I-71/I-670 interchange. This gas line is a known conflict with the Step 7 Engineering Plans (See Appendix RD-03) and will be abandoned in advance of this project by Columbia Gas forces. There are no restrictions when working around the abandoned 12” gas line. Portions of the abandoned gas line may be removed when in conflict with the proposed roadway work. Refer to Appendix UT-09 for proposed plans.

6.8.2 Other Utility Facility Relocations
Additional utility facility relocations, modifications and adjustments may be necessary as a result of the details of the DBT’s final design. All such utility facility relocations, modifications and adjustments shall be coordinated by the DBT with the affected utility. All such utility facility relocations, modifications and adjustments shall be executed by the DBT or the affected utility owner as appropriate.

6.9 Proposed Utility Installations

6.9.1 Fire Protection System
The DBT shall design and install fire protection systems as specified by this section.

6.9.1.1 Water Lines, Fire Hydrants and Dry Standpipes
New water lines, fire hydrants and a dry standpipe system shall be installed to the specifications and at the locations described in sections 6.9.1.1.1, 6.9.1.1.2 and 6.9.1.1.3.

6.9.1.1.1 Water Lines
The DBT shall design and install 8” water lines as necessary to provide service to the fire hydrants described in Section 6.9.1.1.2. All water line materials and installations shall be in accordance to the most current City of Columbus Division of Water and Power (Water) regulations and the most current City of Columbus Construction and Materials Specifications. The DBT is responsible for obtaining any necessary permits and the paying of all fees.

6.9.1.1.2 Fire Hydrants
Fire hydrants and watch valves shall be installed between the median barriers every 1000’ within the depressed section of I-71 (southern work limit to Spring Street) and outside both ends of structure FRA-71-1784B.

Fire hydrants and watch valves shall be offset at least 6’-6” from the back of guardrails. Fire hydrants set between the median barriers of I-71 shall be equidistant from the back of each concrete barrier. Hose connections shall be set at an elevation that is at least 8” higher than the top elevation of the guardrail or concrete barrier. Hydrant settings shall conform to City of Columbus Standard Drawing L-7601.

6.9.1.1.3 Dry Standpipe System
A 6” dry standpipe system shall be installed within structure FRA-71-1784B.

The longitudinal portion of the dry standpipe shall be ductile-iron pipe that conforms to the standards of AWWA C151 and shall be lined in accordance with AWWA C104, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
24” wide, 18” deep wall notches shall be constructed to accommodate the vertical portions of the standpipe. These portions of the standpipe shall be ductile-iron pipe that conforms to ANSI/AWWA C115/A21.15, and shall be constructed by bolting the flanges together per the aforementioned standard.

The dry standpipe system shall be a Class 1 system in accordance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

The required flow rate for the standpipe system shall not be required to exceed 500 gpm (NFPA 502, 6-1.1)

Fire Department connections shall be a 5” Storz connection that is accessible to a fire department pumper. Hose connections shall have 2 ½” external threads in order to accept a siamese wye. All connections shall be in accordance with NFPA 1963, Standard for Fire Hose Connections. All fire department connections shall be approved by the Columbus Fire Department prior to installation. All connections shall be between 36” to 60” from top of finished pavement grade.

The DBT shall ensure that the dry standpipe maintains positive drainage and outlets to a proposed storm sewer structure.

Dry standpipe identification signage shall be conspicuous and shall be affixed immediately adjacent to fire department connections and each roadway hose connection. The fire department connections accessible to the pumper shall be at a minimum of 25 ft outside of the exit and entrance to the structure, shall be easily accessible, and shall be protected from potential damage by vehicles.

### 6.9.1.2 Fire Alarm and Traffic Control Systems

#### 6.9.1.2.1 Fire Alarm System

The DBT shall design and install a fire alarm system at structure FRA-71-1784B with manual stations, detectors, control, devices and flashing red lights.

Definitions of NFPA 72 apply to the fire alarm terms used in this section.

The fire alarm system shall be a non-coded Digital System with Manual and Automatic Alarm initiation. Submittals shall be delivered to the Department and forwarded to the City of Columbus for review. Review times described in Section 2.6.4.9 and Section 6.4.1 shall apply. Submittals shall include the following:

A. Product data for each type of product indicated

B. Shop drawing as follows:

1. Wiring diagrams: detail wiring and differentiate between manufacturer-installed and field-installed wiring. Include diagrams for equipment and for system with all terminals and interconnections identified.

2. Battery: sizing calculations

3. Floor plans: indicate final outlet locations and routings of raceway connections.
4. Digital device list: coordinate with final system equipment.

5. System operation description: detailed description for this project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer’s standard descriptions for generic systems are not acceptable.

C. Fire Alarm Control Panel (FACP) and battery cabinet drawings:

1. Front and interior layouts
2. Components list
3. Nameplate and legend lists
4. Details

D. Operating instructions for mounting at the FACP

E. Product certificates signed by the manufacturers authorized representative of system components certifying that the products furnished comply with requirements.

F. Installer verifying that the installation was installed to comply with all requirements of the authorized representative.

G. Field test reports that indicate and interpret test results for compliance with performance requirements, Comply with NFPA 72.

H. Maintenance data for fire alarm system to be included in maintenance manuals. Comply with NFPA 72.

I. Submissions to authorities having jurisdiction: in addition to distribution requirements for submittals, make an identical submission to authorities having jurisdiction. Include copies of annotated contract drawings as needed to depict component locations to facilitate review. Resubmit if required to make clarifications or revisions to obtain approval.

J. Certificate of completion to comply with NFPA 72.

Installer shall be an experienced installer who is an authorized representative of the FACP manufacturer for both installation and maintenance of unit required for this project.

Manufacturer shall be a firm experienced in manufacturing systems similar to those indicated for this project and with a record of successful in-service performance.

The authorized representative for the FACP shall review the system to ensure compliance with all required local and state codes.

Obtain the fire alarm system through one source.

Comply with applicable building code, local ordinances and regulations and requirements of authorities having jurisdiction.
Comply with NFPA 72.

Furnish extra materials described below that match products installed and are packaged with protective covering for storage and identified with labels describing contents.

A. Lamps for indicating lamp units: quantity equal to 10 percent of amount installed, but not less than one unit.

B. Keys and tools: one extra set for access to locked and tamperproof components.

The system shall function as follows:

A. Control of system to be by the FACP.

B. Provide system supervision to automatically detect and indicate open circuits, shorts and grounds of wiring for initiating device, sensor and notification-appliance circuits, except advanced “RAMP CLOSED” signs.

C. Priority of signals: automatic alarm response functions resulting from an alarm signal from one zone or device are not altered by subsequent alarm, supervisory or trouble signals. An alarm signal is the highest priority. Supervisory and trouble signals have second – and third – level priority. Higher priority signals take precedence over signals of lower priority, even when the lower priority condition occurs first. Display all alarm, supervisory and trouble signals regardless of priority or order received.

D. Structure FRA-71-1784B shall be considered a single zone for automatic fire detection.

E. The system shall be manually resettable from the FACP after initiating devices are restored to normal.

F. System alarm capability shall perform as follows during circuit fault conditions: system wiring and circuit arrangement prevent alarm capability reduction when a single ground occurs in an initiating device circuit, sensor line circuit or notification-appliance circuit.

G. Upon loss of primary power at the FACP, automatically transfer the load to the emergency battery backup power system, and the FACP shall operate on 24 volts DC.

H. Loss of primary power at the FACP initiates a trouble signal at the FACP. The FACP indicates when the fire alarm system is operating on the backup power supply.

I. Comply with the following basic alarm performance requirements: unless otherwise indicated, operation of a manual station or automatic alarm operation of a sensor detector initiates the following:

1. Notification-appliance operation

2. Identification at the FACP of the device originating the alarm.

J. Alarm acknowledge, system reset and indication shall be controlled by switches in the FACP.
1. Acknowledge switch operation halts alarm operation of notification-appliances and activates an “Alarm Acknowledge” light. Display of identity of the alarm device is retained.

2. Subsequent alarm signals from other devices reactivate notification appliances until the acknowledge switch is operated again.

3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate as normal.

K. Removal of alarm-initiating device or a notification appliance initiates a “TROUBLE” signal indication at the FACP for the device involved.

L. Testing of the linear heat detection sensor shall require a simple check at the FACP, but will not require traffic shutdown.

Provide manual initiating stations fabricated of cast aluminum and finished in red with molded, raised-letter operating instructions or contrasting color. Double action mechanism shall activate the alarm. Provide manual reset operated by double-pole, double-throw switch rated for the voltage and current at which it operates. Station shall be arranged to communicate manual-station status (normal, alarm or trouble) to the FACP. Provide a weatherproof cast aluminum back box for surface mounting complete with gasket.

Provide remote indicating lights and identification plates at the manual initiating stations. Provide Red and White LED indicating lights at each of these alarm stations. Light shall be connected to flash when the associated device is in an alarm or trouble mode. Hand pulls shall be NEMA-4 or 4x. White LEDs at manual pulls shall indicate their locations and flashing Red LEDs shall indicate alarm. In case of trouble in the system, White LEDs shall start flashing. When FACP is reset, the flashing White LED will reset. Lamp shall be mounted on a single gang cast aluminum box for surface mounting complete with gasket. A red, laminated phenolic-resin identification plate at the indicating light identifies, in engraved white letters, initiating “STATION ALARM OR TROUBLE – RESTORE STATION TO NORMAL THEN RESET AT FACP.”

A linear heat detector cable that detects heat anywhere along its length shall be used. The sensor cable is comprised of two steel conductors individually insulated with heat sensitive polymer. The insulated conductors are twisted together to impose a spring pressure between them, then wrapped with a protective tape and finished with an outer jacket suitable for the environment in which the detector will be installed.

The linear heat detector cable is a fixed temperature digital sensor and is to be capable of initiating an alarm once its rated activation temperature is reached. At the rated temperature, the heat sensitive polymer insulation yields to the pressure upon it, permitting the inner conductors to move into contact with each other thereby initiating the alarm signal. This action takes place at the first heated point anywhere along the detectors length. It does not require that a specific length be heated in order to initiate an alarm nor is system calibration necessary to compensate for changes in the installed ambient temperature.

Provide a fire alarm control panel (FACP) in accordance with the following:

A. The cabinet shall be a pad lockable NEMA 4x stainless steel enclosure. Arrange interior components so normal operations, testing, or normal maintenance of system are performed.
from the front of the enclosure. Normal operations controls and indicators shall be mounted on an interior swing-out panel behind the normally closed front door with fast operating door clamps. If more than one unit is required to form a complete control panel, fabricate with matching modular unit enclosed to accommodate components and to allow ample gutter space for field wiring and interconnecting panels. Furnish padlocks in accordance with 631.08.

1. Identify each enclosure with an engraved, red, laminated, phenolic-resin nameplate with lettering not less than 25 mm high. Identify individual components and modules within cabinets with permanent labels. Attach all nameplates with stainless steel screws.
2. Mounting shall be surfaced and will be outdoors.

B. Alarm and supervisory system shall be separate and independent in the FACP. Alarm-initiating boards shall consist of plug-in cards. Construction requiring removal of field wiring for module replacement is unacceptable.

C. Control modules and meters shall include types and capacities required to perform all functions of fire alarm systems.

D. Indications shall be local, visible signals to indicate alarm, supervisory, and trouble conditions. Each type indicator shall have a different color.

E. Resetting controls shall prevent the resetting of alarm, supervisory or trouble signals while the alarm or trouble condition still exists.

F. The primary input power to the FACP shall be 120 volts, single phase, 60 hertz to a circuit breaker in the FACP.

1. Provide surge protection on the input.
2. Provide ground lugs as required.

G. Provide a power supply sized and connected so that the entire system can operate on 24 volts DC in normal and emergency modes. This shall include the FACP, sensor line circuit, remote initiating station and indicating light circuits, and the notification appliance (flashing red light) circuit. Provide a properly sized output relay or contractor for the notification appliance circuit.

H. The FACP shall operate outdoors in an environment with ambient temperatures from -23°C to 49°C and relative humidity from 0 to 95%. Provide a heater and thermostat as required in the FACP.

I. Provide terminal blocks and stranded copper wiring with all wiring and terminals labeled in the FACP.

J. Wiring within enclosures shall be separate for power-limited and non-power-limited conductors as recommended by the manufacture. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal
according to the system’s wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

K. Instructions shall be printed or typewritten instruction card mounted behind a plastic or glass cover in a stainless steel or aluminum frame. Include interpretation and describe appropriate responses for display and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions. Install instructions on rear side of FACP front door to be viewed when operating controls.

L. The FACP shall be able to activate the controller for advance warning overhead signs (see Section 6.9.1.2.2.2).

M. The FACP shall be able to contact a minimum of five (5) telephone numbers with pre-recorded message to notify authorities. (Typical telephone service used). The DBT is required to obtain telephone service to the FACP from local providers. ODOT will provide monitoring contact information upon a 30 day notice from the DBT.

N. FACp shall have separate switch which will activate emergency beacons and advanced warning LED signs for use in other emergencies which require closure of structure. This manual activation shall not constitute an alarm activation.

Provide an emergency power supply at the FACp in accordance with the following:

A. Components shall include valve-regulated, recombinant lead acid battery, charger and an automatic transfer switch. The battery nominal life expectancy shall comply with NFPA 72.

B. Battery capacity shall comply with NFPA 72.

C. Battery charger shall be solid-state, full automatic, variable-charging-rate type. Provide capacity for 150 percent of the connected system load while maintaining batteries at full charge. If batteries are fully discharged, the charger shall recharge them completely within four (4) hours. Charger output shall be supervised as part of system power supply supervision.

D. Integral automatic transfer switch shall transfer the load to the battery without loss of signals or status indications when normal power fails.

E. Separate battery cabinet shall be padlockable NEMA 4x stainless steel enclosure. Furnish a padlock in accordance with ODOT CMS 631.06.

F. The advance warning overhead signs shall not be on the backup battery (see 6.9.1.2.2.2)

Mount equipment such that sufficient access and working space is provided for ready and safe operation and maintenance. Securely fasten equipment to enclosure back panel supports, channels or other surfaces on which they are mounted. Provide galvanized steel channel supports for electrical equipment mounting. Use stainless steel material for miscellaneous hardware.

Install the linear heat detection sensor in accordance with manufacturer’s recommendations.

Mount manual initiating stations and indicating lights in surface mount back boxes.
Install the FACP and battery cabinet surface mounted on galvanized steel channel supports on concrete wall with tops of cabinets not more than 6 feet above finished grade.

Use numbered terminal strips in junction outlet boxes, cabinets or equipment enclosures where circuit connections are made.

Provide grounding for fire alarm system as follows:

A. Ground cable shields and equipment according to systems manufacturer’s written instructions to eliminate shock hazard and to minimize, to the greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk and other impairments.

B. Provide signal ground terminal located at main equipment rack or cabinet. Isolate from power system and equipment grounding.

C. Install grounding electrodes of type, size, location and quantity as indicated.

D. Ground equipment and conductor and cable shields/ Provide 5-ohm ground at main equipment location. Measure, record and report ground resistance.

Provide field quality control in accordance with the following:

A. Manufacturer’s field service: engage a factory-authorized service representative to inspect field-assembled components and connections and to supervise pre-testing, testing and adjustment of the system. Report results in writing.

B. Pre-testing: After installation, align, adjust and balance the system and perform complete pre-testing. Determine, through pre-testing, the compliance of the system with requirements of drawings and specifications. Correct deficiencies observed in pre-testing. Replace malfunctioning or damaged items with new ones, and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.

C. Report of pre-testing: after pre-testing is complete, provide a letter certifying the installation is complete and fully operable, including the names and titles of witnesses to preliminary tests.

D. Final test notice: provide a minimum of ten (10) days notice in writing when the system is ready for final acceptance testing.

E. Minimum system tests: test the system according to procedures outlined in NFPA 72. Minimum required test results are as follows:

1. Verify the absence of unwanted voltages between circuit conductors and ground.
2. Test all conductors for short circuits using an insulation-testing device.
3. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter. Record the circuit resistance of each circuit on record drawings.

4. Verify that the control unit is in the normal condition as detailed in the manufacturers operation and maintenance manual.

5. Test initiating and indicating circuits for proper signal transmission under open circuit conditions. One connection each should be opened at not less than 10 percent of initiating and indicating devices. Observe proper signal transmission according to class or wiring used.

6. Test each initiating and indicating device for alarm operation and proper response at the control unit. Test sensor detectors with actual products of combustion.

7. Test the system for all specified functions according to the approved operation and maintenance manual. Systematically initiate specified functional performance items at each station, including making all possible alarm and monitoring initiations and using all communications options. For each item, observer related performance at all devices required to be affected by the item under all system sequences. Observe indication lights, displays and meter indications.

8. Test primary and emergency power: verify by test that the emergency power system is capable of operating the system for the period and in the manner specified.

F. Retesting: correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets specifications and complies with applicable standards.

G. Report of tests and inspections: provide a written record of inspections, tests and detailed test results in the form of a test log. Submit the log on the satisfactory completion of tests.

H. Tag all equipment, stations and other components at which tests have been satisfactorily completed.

Engage a factory-authorized service representative to train owner’s maintenance personnel as specified below:

A. Train owner’s maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, adjusting and maintaining equipment and schedules. Provide a minimum of 8 hours training.

B. Training aid: use the approved final version of the operation and maintenance manual as a training aid.

C. Schedule training with owner with at least 7 days advance notice.
When requested within one year of date of substantial completion, provide on-site assistance in adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three (3) requested visits to the project site for this purpose.

6.9.1.2.2 Traffic Control System
A traffic control system shall be installed on the approach to structure FRA-71-1784B. This traffic control system shall be integrated into the fire detection system and consist of:

- Static sign with two (2) flashing red beacons
- Advance warning fixed message signs

6.9.1.2.2.1 Static Sign
The DBT shall install an overhead mounted sign which shall read:

TUNNEL CLOSED
WHEN FLASHING

The minimum letter size on the sign shall be 12” uppercase. The overhead mounted sign shall be a Level-1, black on white, extrusheet sign. The location of the overhead mounted sign shall be immediately adjacent to the entrance of the tunnel.

Two (2) beacons – one on each side of the overhead mounted sign – shall be installed. When activated by the FACP, the beacons shall flash simultaneously.

Each beacon shall be a single traffic signal section with a 12” lens and high intensity red light emitting diode (LED) lamp modules. The flasher control unit shall flash the beacons at a rate of between 50 to 60 times per minute with the light period from one-half to two-thirds of the total cycle. The flasher control unit shall have all solid state components and shall meet NEMA TS-1, part 6. The control unit shall be housed within a weatherproof corrosion resistant enclosure with a lockable door. Electrical supply to the beacons shall be 12 or 24 volts DC and the beacons shall flash when activated by the FACP.

6.9.1.2.2.2 Advance Warning Fixed Message Signs
The FACP shall be able to activate the controller for advance warning overhead signs. The advance warning signs shall be Light Emitting Diode (LED) fixed message signs installed above all advance freeway guide signs which are specific to the approach to structure FRA-71-1784B. This consists of the advance signing from I-71 northbound to both I-670 westbound and I-670 eastbound. Sign support locations are on I-71 northbound, south of E. Town Street and I-71 northbound south of E. Oak Street. Proposed advance guide signs can be seen on the Concept Guide Sign Plan, Appendix TC-16. Activation can not be performed with a wireless connection.

The LED fixed message signs shall be as per ODOT CMS Item 631. The legend shall read RAMP CLOSED in red letters. Characters shall be a minimum of 18” high. The sign legend shall only be visible when the fire detection system has an alarm or by manual activation of the system; otherwise, the sign legend shall be blank. Intermediate sign brackets shall be installed as per ODOT Standard Construction Drawing TC-22.20 and extended to the upper edge of the LED signs.
LED fixed message signs may need to be added to existing truss sign supports. The DBT shall analyze existing sign supports for structural adequacy as per Section 15.3.

Electrical supply to the LED fixed message signs shall be 120 volts AC. Each sign shall have its own, separate disconnect switch. The advance warning fixed message signs shall not be included on the battery backup circuit.

### 6.9.2 Conduit on Long Street Bridge

The DBT shall design and install conduits on the Long Street bridge for utility accommodation. The proposed conduits shall be bulletproof fiberglass with appropriate protection at the back wall and cross frames per the Department’s bridge design standards. The size and configuration of the proposed conduits are summarized in Table 6-1.

<table>
<thead>
<tr>
<th>Location</th>
<th>No. of Conduits</th>
<th>Size of Conduits</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEP</td>
<td>4</td>
<td>5-inch</td>
<td>2 x 2</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>2</td>
<td>4-inch</td>
<td>1 x 2</td>
</tr>
<tr>
<td>Time Warner</td>
<td>1</td>
<td>4-inch</td>
<td>-</td>
</tr>
</tbody>
</table>

The location of the proposed conduit banks shall all be located within 1 bay of the Long Street Bridge. The location shall be in the bay closest to approximate offset of 23.5 ft Right of the existing Long Street centerline. The different utilities banks shall be sufficiently separated (minimum of 1 ft horizontally) and shall not be stacked vertically.

Exact locations of necessary facility locations (e.g. pullboxes, conduits, vaults, etc.) shall be co-ordinated with the corresponding utility. The DBT shall co-ordinate the design with the affected utilities and install necessary permanent facilities within the project limits for the required final relocations for the Long Street bridge crossings.

### 6.9.3 Proposed Utilities for Future Development on Long Street Bridge Cap

The DBT shall be responsible for providing ducts for utilities to service future development on the Long Street Bridge cap. A list of these utility services is provided in Section 6.9.3.1. The DBT shall be responsible for coordination with the owners of all utility facilities affected by the project. The resolution of any conflicts between the owners of the affected utility facilities and the construction of the project shall be the responsibility of the DBT.

#### 6.9.3.1 Future Building Requirements

The following facilities are required at the Long Street Bridge cap:

A. 3” domestic water line (service shall tap into DOPW(Water) proposed 24” water main)
B. 16,000 amp 120/208 volts, 3 phase, 4 wire electric service (service provided either by AEP or DOPW(Power))

C. 2” medium pressure gas line (service provided by private owner)

D. 6” sanitary line (service shall outlet into DOSD sanitary)

E. 2 – 4” telephone / data conduits (service provided by private owner)

The DBT shall provide empty, concrete encased conduits that stub 5’ beyond the end of the approach slab of the Long Street Bridge for all private services (power, gas, telephone / data). The DBT shall provide the number and size of conduits necessary to grant private facility owners access from a future extension of their utility onto the structure thru the abutment wall based on the requirements listed above. The DBT shall provide the City of Columbus with As-Built plans showing the stub locations, labeled with a station and offset. The DBT shall extend the empty conduit thru the back wall of the Long Street Bridge, terminating the service with a stub within the utility bay of the bridge. The stub shall be capped and sealed.

The DBT shall provide taps into existing facilities for all public services (water and sanitary). The DBT is responsible for obtaining any necessary permits and paying of all fees. The water and sanitary shall be constructed in the appropriate size casing pipe within the approach slab limits. Spacers shall be used per City of Columbus standards. The casing pipes shall be filled with sand after the conduit is constructed. The DBT shall extend those services to the Long Street Bridge, terminating the service with a stub within the utility bay of the bridge. The stub shall be properly capped and sealed per City of Columbus standards. See Sections 6.9.3.2 and 6.9.3.3 for more information.

The DBT shall provide taps into existing water facilities for installation of irrigations systems outlined in AE-02. The DBT is responsible for obtaining any necessary permits and paying of all fees.

All utility conduit extensions thru the backwall of the bridge will be grouted in place and stubbed 6” inside of the backwall. See the detail in Appendix AE-02 for approximate elevation and location information for the utility conduit stubs, waterline, and sanitary line. Expansion joint fittings shall be used as necessary to convey the utilities thru the backwall.

6.9.3.2 3” Domestic Water Line

The 3” domestic water line shall meet the following requirements:

- The domestic water line will tap into the relocated 24” waterline on the west side of the Long Street Bridge. For relocation information, see Section 6.8.1.2. The tap location shall be coordinated with the City of Columbus DOPW(W) and occur within the intersection of Long Street and Lester Drive. The tap shall conform to the requirements of the City of Columbus Construction and Material Specifications (CMS), current edition and the City of Columbus Standard Drawings and Guidelines (see Appendix UT-12).

- Water line shall be ductile iron conforming to requirements of the City of Columbus Construction and Material Specifications (CMS), current edition.
- The proposed water line shall be installed at a minimum depth of 4’, as necessary to connect to relocated 24” water main.

- The DBT shall provide a frost-free shut off valve and any necessary insulation to prevent freezing.

- All water line materials shall be on “Division of Power & Water (Water) Approved Materials List”. The Department’s Qualified Products List (QPL) list shall not apply to water main materials approved for installation.

- All ductile iron pipe shall be wrapped with polyethylene encasement as per AWWA C-105. Design of jack and bored pipe (if required) shall include corrosion protection system as necessary to protect the carrier pipe.

- The DBT shall reference the City of Columbus DOPW (W) General notes.

6.9.3.3 6” Sanitary Line

The 6” sanitary line shall tie into the existing combined storm – sanitary sewer at the manhole at Station 52+62.60, 14.6’ right. The DBT shall coordinate the design of the 6” sanitary line with the relocation the existing 42” sanitary siphon. See Section 6.8.1.4 and Appendix UT-14 for information regarding the relocation of this siphon. No connection will be made directly into the 42” sanitary siphon.

All proposed connections to the City of Columbus sanitary or combined sewer systems will require City of Columbus Sanitary Sewer Permits in accordance with Columbus City Codes Section 1133.07, which must be obtained at the Division of Sewerage and Drainage Permit Office, 910 Dublin Rd., Columbus, Ohio 43215, phone 614-645-7490.

The DBT shall design the 6” sanitary line with an ejector pump system; a gravity system design is not permitted. The DBT shall ensure the design of the 6” sanitary provides space for a future grease trap. The DBT shall not be responsible for installing a grease trap.
Intentionally blank
7 Right-of-Way

7.1 General
ODOT has acquired temporary and permanent right-of-way (or adequate legal right-of-entry agreement) necessary for the project. The right-of-way plans prepared for this project indicates the existing right-of-way lines and those right-of-way parcels acquired for the project. The right-of-way plans also indicate permanent and temporary easements acquired by ODOT for the project. The DBT’s right of entry and use of the project site arises solely from permission granted by ODOT under the contract. Refer to Appendix RW-01 for right-of-way plans.

7.2 Monument and Fence Construction
The DBT shall design and construct the right of way fence, survey monument assemblies, reference monuments and any other items associated with monuments according to ODOT CMS Item 604 and ODOT Real Estate Policies and Procedures Manual Sections 3100 & 3200 (Right-of-Way Plan Manual). Monuments and fence on ODOT-maintained facilities shall be in accordance with ODOT standards. Monuments on City of Columbus-maintained facilities shall be in accordance with City of Columbus standards.

7.3 Columbus State Community College Right of Entry
The Department and Columbus State Community College have signed a Contract for Right of Entry for this project. This Contract is included in Appendix RW-02. The DBT is to comply with and perform the requirements assigned to ODOT in the following sections:

2. Rights of Possession and Use
3. Access to Work Areas
4. Safety Considerations
5. Parking Areas
6. Retaining Wall and Fencing
7. Construction Moratoria
8. Replacement of Trees
9. Utilities

The Memorandum of Agreement referenced in the Contract for Right of Entry is included in Appendix RW-03.

The following parties are designated as Columbus State Community College’s agents for the purpose of delivery and receipt of all notices and communication:

Columbus State Community College
Attention: Paul Goggin, Interim Director, Facilities Services
March 2, 2011

550 East Spring Street
Columbus, OH 43216
(614) 287-5060
pgoggin@csc.edu

Columbus State Community College
Attention: John Nestor, Director of Public Safety
550 East Spring Street
Columbus, OH 43216
(614) 287-2525
jnestor@csc.edu

The ODOT District Public Information Officer is to be advised of all communication with Columbus State Community College and provided copies of all communication.
8 Geotechnical

8.1 Governing Regulations
The DBT shall conduct all Work necessary in accordance with current practices and with due diligence in all areas of engineering including but not limited to geotechnical exploration, analysis, design, and construction.

Governing regulations are listed in Section 1.14 and supplemental specifications are listed in Section 1.15. In the event of a conflict among the standards listed in Section 1.14 related to geotechnical engineering, the Department’s standards shall take precedence.

8.2 Subsurface Exploration

8.2.1 Existing Subsurface Exploration
The Department has provided subsurface exploration information for anticipated locations of roadway, embankments, excavations, retaining walls, bridge foundations, and microtunnel for storm sewers. This exploration was performed for the preliminary design purposes. This exploration information, in the form of boring logs, soil profile plan sheets, and reports, along with historic explorations, are presented in Appendix GE-01. All exploration information is representative of site conditions at the time and location of the exploration.

Proposers are responsible for reviewing and analyzing the geotechnical information provided with the RFP. Soil samples obtained from the latest subsurface exploration, which were not consumed by testing, are available for inspection by the Proposers at DLZ, located at 6121 Huntley Road, Columbus, Ohio. Soil profiles created by DLZ for the I-71/I-670 interchange are located in GE-02.

Soil and groundwater conditions are only known at the boring locations at the time of the explorations. Interpretation and interpolation between boring locations shall be at the sole risk of the Proposer. It is the Proposer’s responsibility to make interpretations and draw conclusions with respect to the character of the geotechnical materials encountered and their impact upon its work.

8.2.2 Additional Subsurface Exploration
The actual locations, shape, and other geometrics of the project features will be determined by the DBT within certain constraints set forth in the RFP and Contract. It is the responsibility of each Proposer to determine the need for and conduct additional subsurface explorations as it deems necessary and at its own expense to familiarize itself completely with all pertinent existing subsurface conditions, and thus allow the Proposer to properly design, price, and construct the Project. Proposal submission will be considered conclusive evidence that the Proposer has determined that it has performed a reasonable site exploration. Subsurface explorations refer to geotechnical borings, cone penetration tests, geophysical methods, and other in-situ testing methods, and laboratory tests conducted to support the analysis and design of subgrades, embankments, fills, bridges, walls, large culverts, and tunnels.
After the award of the contract, if the DBT determines additional subsurface explorations are necessary to properly design and construct the Work, the DBT shall perform the additional subsurface explorations and analysis at its own expense. The DBT shall selectively locate additional subsurface explorations on the basis of field observations, and design considerations. Location of explorations shall be as topography, site conditions, soil conditions, and design factors dictate. The DBT shall add all additional subsurface exploration information to the provided soil profile in accordance with the Specifications for Geotechnical Explorations.

For all additional subsurface explorations performed at the Proposer/DBT’s expense, the Proposer/DBT shall secure an access permit from the appropriate agency, if required, which may require the preparation of an equipment access plan, description of equipment types, a plan of the test locations, etc. The Proposer/DBT shall adhere to all traffic control requirements when taking samples on existing roadways. A traffic control plan may be required. Additional subsurface explorations may take place at any time before or after submission of the Proposal. The Proposer/DBT shall not enter any private property without permission from the private property owner. Prior to project award, the Proposer shall not enter any private property acting as an agent of the State of Ohio. If prior to award, the Proposer wishes to enter State of Ohio property, they must apply for the proper permit through the Department Office of Permits. After award, the selected DBT may enter any State of Ohio property in the project limits at any time, but parcels not yet purchased by the State of Ohio for this project may not be accessible without specific permission from the property owner. All subsurface explorations, including sampling and laboratory testing, shall be performed in accordance with the latest Specifications for Geotechnical Explorations, AASHTO standards, and ASTM standards. The DBT shall perform all laboratory testing at a Department pre-qualified geotechnical testing laboratory.

8.3 Design Requirements

8.3.1 Geotechnical Design Reports
All geotechnical design and additional geotechnical explorations performed by the DBT shall be completed and submitted to the Department in a report format following the guidelines of Section 700 of the Specifications for Geotechnical Explorations.

8.3.2 Foundation Analysis and Design
The DBT shall use the subsurface exploration information provided along with any supplemental information gathered to design foundations for each structure. The DBT shall exercise due diligence during the conduct of geotechnical engineering design, and all technical aspects must be evaluated to find appropriate engineering solution for the design under consideration. The DBT shall perform all foundation analyses and designs using the AASHTO Load Resistance Factor Design [LRFD] method. Allowable Stress Design Method (ASD) shall only be used where LRFD design methods do not yet exist in the specified documents.

Foundation movement criteria shall meet the requirements of AASHTO LRFD Section 10.5.2 and related commentary.
For laterally loaded shafts see Appendices GE-6, GE-7, and GE-10.

The DBT shall produce and submit a Foundation Analysis and Design Report (Foundation Report as defined in BDM and SGE) for each structure. The report shall include all engineering analyses and design recommendations.

The DBT shall not utilize any existing or abandoned substructure or foundations, except for Bridge No. FRA-71-1835L, (SFN 2507749).

8.3.3 Microtunnel Construction and Design

The DBT shall use the subsurface exploration information provided in Appendix GE-03, along with any supplemental information gathered to design and construct a microtunnel for installation of storm sewer described in Section 11.4.5. A report specifically addressing the design of the microtunnel and microtunnel construction procedures, as presented in Section 11.4.5, shall be prepared and presented to the Department. The minimum contents of the report are presented in the following paragraphs.

The DBT shall clearly identify all planned microtunnel construction procedures, including sequence, limits, equipment, and schedule.

The DBT shall perform a comprehensive settlement analysis along the entire alignment of the microtunnel, based on the microtunnel construction procedures planned and all necessary pits. This analysis shall include determining the zone of influence from the microtunnel construction. Within this zone of influence, the DBT shall determine all anticipated total and differential settlements and tilt of all structure foundations, abutments, walls and roadway facilities, as a result of the microtunnel operations. The DBT shall acquire the existing structure plans from the Department. The plans include, but are not limited to FRA-62-15.30 (1962), (FRA-3-17.17, FRA-62-15.96, FRA-102-0.00) (1961), FRA-3-16.91 (1960), FRA-3-17.17, FRA-62-15.96, FRA-102-0.00 (1961), FRA-62-15.30 (1962), FRA-670-3.17 Part 1 (2001), FRA-670-4.36 (1994) and FRA-670-4.91 (1992). Data from the plans shall be used to model structure location and weight to determine anticipated structure movement.

The DBT shall perform a structural analysis of every structure within the zone of influence to determine allowable substructure and superstructure settlement and tilt. The DBT must clearly identify how the allowable values were determined.

The DBT shall perform stability and settlement analyses for all pits, including recovery pits, and all structures and roadway facilities within the zone of influence of planned pits.

The DBT shall summarize all settlement and stability analyses results, comparing them to allowable values, and identify planned procedures for maintaining settlements of structures within the allowable limits. The procedures may include any one or more of the following:

i. Overcut
ii. Pressure grouting of the tunnel alignment prior to tunneling
iii. Compensation grouting
iv. Special equipment requirements  
v. Alignment change  
vi. Other ground improvement methods

The DBT shall perform a pre-construction survey of the roadway and structures within the zone of influence or within 50 feet of the microtunnel alignment, whichever is greater. The survey shall include ground line cross sections of the roadway every 50 feet along the alignment of the tunnel, extending to 50 feet left and right of the tunnel centerline. The survey shall also include baseline elevation readings of all structure foundations, abutments and walls within the aforementioned limits to establish base line elevations for settlement and tilt recording.

Prior to microtunneling, the DBT shall submit a plan for obstruction removal from the heading of the microtunneling face (i.e. boulder or boulders). Provide details on when and if the obstruction will be removed from within the tunnel, when recovery pits will be necessary and the time required to complete each operation. Submit descriptions on how the tunnel face will be maintained in stable conditions during obstruction removal. Provide details on how the settlement will be controlled during the obstruction removal from within the tunnel and how the face of the tunnel will be secured until the recovery pit is constructed.

If the DBT microtunnel machine encounters an obstruction that stops the progress of the microtunneling, the DBT shall notify the Department, and submit a plan to ODOT regarding the DBT means and methods and time table to remove the obstruction. The DBT shall avoid long term lane and or ramp closures to remove any potential obstruction. Refer to section 16.7 for freeway closures and section 16.8 for ramp closures. Prior to starting the microtunneling operations, the DBT shall have a design and the materials ready for at least one recovery pit if an obstruction is encountered.

It is anticipated that the DBT will use pressure grouting for ground improvements at all structures that are within the zone of influence of the tunnel alignment .

The DBT is responsible for any damage resulting from microtunnel construction activities. Any voids or deformation caused to pavements shall be repaired to the Department’s satisfaction.

### 8.3.4 Instrumentation

General instrumentation: The DBT shall evaluate and determine the need for geotechnical instrumentation for the purpose of geotechnical design verification. The DBT shall submit an instrumentation plan to the Department. As monitoring data becomes available, the DBT shall submit results in the form of an instrumentation report, to the Department on a regular basis. This report shall include a comparison of the results to design predictions. Refer to Section 8.3.6 for settlement monitoring criteria.

Microtunnel instrumentation: Based on the settlement and tilt analyses prepared by the DBT, the DBT shall develop and submit to the Department a geotechnical instrumentation plan for the purpose of monitoring the tunnel operation and to verify that predicted and allowable movements are not exceeded. The plan must include the methods of settlement and tilt monitoring of all roadway and bridge substructures, super structures and retaining wall units within the zone of influence or within 50 feet of
the microtunnel alignment, whichever is greater. As monitoring data is collected, the DBT shall submit results in the form of an instrumentation report to the Department on a daily basis. Each daily report shall include a comparison of the results to maximum allowable settlement and tilt for the corresponding road surface cross section or structure. The report shall include graph presentation of the movement vs. time with relative location of the tunnel heading noted on the graph.

Subsurface monitoring of the movement shall commence when the tunneling face is within 120 feet of the bridge structure and continue on a daily basis until the readings are stabilized for at least two weeks. The monitoring shall be at 30-foot intervals along the alignment until the tunnel heading is 60 feet past the structure limit. For each monitoring station five subsurface monitoring points shall be utilized across the alignment: one on the tunnel alignment, one on each side of 25 and 50-foot offsets from the alignment. The monitoring data from these points will provide proof that the DBT is attaining predicted movement amounts before tunneling encroaches near the structure. The monitoring reports and statement on the results shall be submitted daily (or on each shift if the tunneling is performed on 24-hour basis).

Recommended instrumentation types:

- a) Roadway surface settlements: PK nail
- b) Roadway subsurface settlement point: 48-inch deep settlement rod, in a casing, cover and flush with surface.
- c) Structure settlement: steel pins (ball head) epoxied into drilled holes
- d) Structure tilt: tilt plates

### 8.3.5 Vibration Monitoring and Control Requirements

The DBT shall control and monitor vibrations when performing demolition and construction activities near buildings, structures, or utilities that may be subject to damage from construction induced ground vibrations. Demolition activities include removal of existing bridges, retaining walls, pavements, and foundations. Construction activities include installation of drilled shafts, pile driving, use of vibratory rollers, or any other operation that causes vibration. Vibration control and monitoring shall conform to the Construction and Materials Specification (CMS) Item 208.15, except as modified below:

1. All references to blasting shall instead apply to demolition and construction activities.
2. The vibration specialist’s experience requirement shall apply for vibration monitoring and need not be specific to rock blasting projects.

The DBT shall perform pre-construction vibration monitoring surveys and conduct pre-construction condition surveys of any buildings, structures, and utilities located within limits determined by the vibration specialist (See Section 1.18 Preconstruction Audio – Video Color Recording). The DBT shall also perform similar post-construction surveys for the same locations. The DBT shall use survey methods acceptable to its insurance company. The DBT is responsible for any damage resulting from demolition and construction activities. If owners or occupants fail to allow access to a property for the pre and post-construction surveys, send a certified letter to the owner or occupant. Make the notification effort and the certified letter part of the pre-construction survey records. Deliver a copy of the pre-construction surveys to the Engineer before beginning construction operations at critical locations or at any location which a
survey was performed. A copy of the post-construction surveys are to be delivered to the Engineer within 30 days after construction is completed in the affected area. Critical locations shall include, but are not limited to existing bridges, retaining walls, utilities, and Columbus Public Schools’ Ft. Hayes campus buildings, Shiloh Baptist church, and St. Paul AME church. See Appendix GE-13 for additional information. Submit deliverables in accordance with CMS Item 208.

8.3.6 Embankment Settlement Monitoring
Where predicted primary settlements are more than 3.0 inches for embankment, install a minimum of two settlement platforms with no less than one platform for every 100 longitudinal feet of representative section. The settlement platforms shall be constructed in accordance with the OGE Settlement Platform / Cells Details & Notes in Appendix GE-05.

The DBT shall submit the Settlement Monitoring Plan to the Department. The DBT shall submit regular monitoring reports as readings become available.

8.3.7 Soil Slopes
Reinforced soil slopes shall not be designed steeper than 1(H):1(V). Reinforced soil slopes shall be designed in accordance with design procedures presented in the latest version of Publication No. FHWA NHI-00-043, “Mechanically Stabilized Earth Walls and Reinforced Soil Slopes.” Geogrid for reinforced soil slopes shall be furnished and installed in accordance with the Special Provision, “Geogrid Reinforcement of Soil Embankment,” presented in Appendix GE-04.

Unreinforced soil slopes shall not be designed steeper than 2(H):1(V).

8.3.8 Subgrade Compaction and Proof Rolling
The Contractor shall prepare suitable subgrade in conformance to the CMS Item 204. The contractor is responsible for identifying the method, location, and dimensions (including depth) of subgrade stabilization in the plans.

Permanent rutting of subgrade in excess of ½ inch shall be considered failure. In addition, elastic (rebound) movement in excess of ½ inch shall be considered failure.
9 Pavements

The DBT shall construct pavements as required by this section. Subgrade requirements are indicated in Section 8.3.8. Subsurface pavement drainage shall be provided using pipe underdrains and shall meet the requirements of the Ohio Department of Transportation Location and Design Manual, Volume 2, Section 1009.

9.1 Pavement Design

Pavement compositions for each section of the project shall be as follows. Item numbers reference Ohio Department of Transportation Construction and Material Specifications (CMS). Clarifications to the CMS are provided in Section 9.2.

9.1.1 Interstate Mainline, Ramps and Directional Roadways

Required pavement compositions for proposed mainline, ramps and directional roadways (as listed in Section 10.3.1, Table 10-1 and Section 10.3.2, Table 10-2) are provided in Appendix PV-01. Shoulder pavement composition shall be identical to the pavement composition provided in Appendix PV-01.

9.1.2 City Streets

Required pavement compositions for proposed city streets (as listed in Section 10.3.3, Table 10-3) are provided in Appendix PV-02. Shoulder pavement composition shall be identical to the pavement composition provided in Appendix PV-02.

Brick crosswalks and concrete pavement (Item 451) shall be provided at the following intersections, and constructed as detailed in Appendix AE-02:

- Spring Street & Southbound Urban Collector
- Spring Street & Northbound Urban Collector
- Long Street & Southbound Urban Collector
- Long Street & Northbound Urban Collector

9.2 Pavement Notes

9.2.1 CMS 452 – Non-reinforced Portland Cement Concrete Pavement

When constructing rigid pavements on the interstate mainline, ramps or directional roadways with the composition described in Section 9.1.1, the final pavement surface shall be finished with longitudinal tining as described in Section 451.09 – Finishing, of the CMS. Transverse tining shall not be permitted. Longitudinal joints shall be placed along lane lines or the center of a lane. Longitudinal joints located within the wheel path of vehicles shall not be permitted.

9.2.2 Proposal Note 420 – Surface Smoothness Requirements for Pavements

When constructing pavements on the interstate mainline, system interchange ramps and directional roadways, the requirements of PN 420 shall apply, except that the description shall be modified as
described in this section. Surface tolerance requirements for other areas such as city streets, service interchange ramps, acceleration and deceleration lanes, shoulders, approach slabs, bridge decks are not a part of this specification (PN 420) and are subject to the requirements of the original item specified.
10 Roadway Design

10.1 Governing Regulations

The design of the mainline, ramps, city streets and transition pavement shall be in accordance with the manuals and guidelines in Section 1.14 and shall be constructed to the design standards of the maintaining agencies listed in Section 1.7 unless otherwise specified in the contract documents.

The DBT shall construct items on city streets according to the applicable City of Columbus Standard Construction Drawings. If the City does not have a Standard Construction Drawing, ODOT Standard Construction Drawings shall apply.

The DBT shall be aware of the approved Interchange Modification Study (IMS) included in Appendices RD-01 (A & B) and RD-02. The IMS was approved as a basis for the design of this project. It contains the operational aspects and the roadways in the project. The DBT has the option to modify the design of the project with regard to adjustments to the physical design and/or function within the limitations provided in Section 10.2. These adjustments shall not affect the operational or safety aspects of the design established in the IMS.

10.2 Basic Configuration

10.2.1 Step 7 Engineering Plans

The Step 7 Engineering Plans are provided in Appendix RD-03 to convey the intent of the Project and depict:

1. Horizontal and vertical alignments (Changes are required as per Section 1.8, Section 10.2.2, Section 10.2.3, and Section 10.2.5. Changes are allowed as per Section 10.2.4.)
2. Lane widths
3. Number of lanes
4. Location and number of interchange ramps
5. Approximate location of project limits
6. Design exception (Appendix RD-10, see Section 10.4)
7. Typical Sections

10.2.2 Updates to the Step 7 Engineering Plans

The following items have been revised or added to the project since the completion of the Step 7 Engineering Plans:

1. The Intersection Details at the following intersections have been revised and shall be constructed as described in Section 10.5.2, Item M.
   - Spring Street and Southbound Urban Collector
   - Spring Street and Northbound Urban Collector
2. A parking lane shall be provided along the east side of the Northbound Urban Collector. See Section 10.3.3, Item F.

3. A parking lane and sidewalk shall be provided along the south side of Jack Gibbs Boulevard. See Section 10.3.3, Item K.

10.2.3 Commitments and Comments to address on Step 7 Engineering Plans
1. The profile of Ramp V2 shall be revised to a maximum of 5.00%. As a result of the Bridge Type Studies in the project area, this will now be possible. Shorten the sag vertical curve at Sta. 1121+50 by 50 feet (New PVI will be Sta. 1121+25). This avoids interference with the Ramp V3 gore. Move PVI at Sta. 1129+00 forward to Sta. 1130+00. Adjust profiles at gores with Ramps V1 and V5.

2. The exit terminal of Ramps X3 and X4 shall be redesigned as a diverging roadway per ODOT L&D Fig. 505-2a. The exit terminal of Ramps X5 and X2 shall be relocated to the east approximately 80 feet to accommodate the redesign to the Ramp X3/X4 exit terminal. No additional right-of-way is to be acquired.

3. The profile of Ramp X4 shall be redesigned to achieve a 50 mph design for the sag curve at Station 2405+00. Coordinate with the profile of Ramp X3 in their common gore.

4. The DBT shall address the following curve-related comments from the compliance review:
   - The superelevation for Ramp W1 Curve C-1 should be 0.025, not 0.026.
   - The superelevation for Ramp W1 Curve C-3 should be 0.027, not 0.028.
   - The superelevation for Ramp W1 Curve C-4 should be 0.036, not 0.037.
   - The design for Ramp X1 Curve C-2 should be 50 mph. (previously 45mph)
   - The design for Ramp X1 Curve C-3 should be 40 mph. (previously 30mph)
   - The design for Ramp X3 Curve C-2 should be 50 mph, not 45. Superelevation rate changes.
   - The design for Ramp X3 Curve C-3 should be 50 mph, not 45. Superelevation rate changes.

5. Although several typical sections show gore areas sloped toward the main freeway pavement, the DBT shall adhere to the guidelines of Section 503.6.4 of LDM Volume 1 to minimize the amount of water draining across the mainline pavement.

6. Since the design speed of Jack Gibbs Boulevard is 35 mph:
   - The superelevation for Curve C-4 shall be 0.040.
   - Curve widening shall be provided for Curve C-3 (2.5’), Curve C-4 (5.0’) and Curve C-5 (3.0’).
   - The vertical curve at Station 75+00 shall provide 250’ stopping sight distance.
• The position of bridge abutments on Structures FRA-71-1784a and FRA-670-4.99 shall be checked to ensure that the horizontal stopping sight distance of 250’ is attained.

7. The following revisions shall be made to Ramp V2 and Leonard Avenue and are described in Appendix RD-09:

• The nose of Ramp V2 shall be moved 200’ to the northeast to Sta. 556+00 (I-670)
• The resulting terminal taper for Ramp V2 will be from 25’ right of I-670 pavement (Sta. 556+00) to 12’ right (Sta. 562+50). This is a 50:1 taper.
• The Ramp V2 horizontal alignment shall remain unchanged up to Sta. 1150+14.92, at which point a compound curve shall be introduced to tie the alignment into the relocated nose.
• Shoulder width revisions are required on the right side of Ramp V2 to ensure the availability of horizontal sight distance along the bridge parapets and retaining walls.
• Install rumble strips per Standard Construction Drawing BP-9.1 in the common shoulder shared by Ramp V2 and Ramp X6 from Sta. 548+50 to Sta. 554+00.
• The Leonard Avenue alignment and multi-use path shall shift to the southeast to accommodate the Ramp V2 revisions.
• No additional right-of-way is to be acquired.

8. Since no additional design exceptions will be considered, the above listed items must be addressed.

10.2.4 Adjustments to Step 7 Engineering Plans

Adjustments to the horizontal and vertical alignments will be allowed without being considered a change to the basic configuration provided they meet the following requirements, and are consistent with Section 1.14:

1. Adjustments shall conform to the lane arrangement in the Step 7 Engineering Plans.
2. Vertical alignments shall not be changed to exceed a maximum grade of 3 percent for the mainline or a maximum grade of 5 percent for the ramps and city streets.
3. Minimum structure clearances provided in Section 12.2.8 shall be met.
4. Bridge substructure elements and retaining walls shall be set to comply with sight distance criteria contained in ODOT’s L&D Manual, Volume 1, Section 201.
5. The I-71 median width, from the Spring Street bridge to the southern terminus of the project, shall be 32 feet. See typical sections in Appendix RD-03.
6. As it pertains to Sections 503.6.5, 505.1.6, and 505.2.5 of the LDM Volume 1, the minimum decision stopping sight distance for ramp terminal areas shall be 125 percent of the minimum stopping sight distance for the approach roadway design speed.
7. Changes requiring design exceptions other than those listed in Section 10.4 will not be permitted.
8. Distances between gores on the mainline and ramps shall not be reduced.
10. All mainline shoulders shall be 12 feet wide. Mainline roadways are described in Section 10.3.1.
11. Changes to horizontal alignments of roadways which affect the distance to nearby drives or alleys shall adhere to the following:

“The minimum distance from a City street or ramp intersection to a driveway, alley or other intersection shall be not less than 105’ when intersecting a street with a 25mph design speed, or 150’ when intersecting a street with a 35mph design speed. This distance is measured from the near right-of-way line of the City street or ramp to the centerline of the driveway, alley or other intersection.”

In those cases, listed below, where the Step 7 Engineering Plans provide less than the above distances, any changes by the DBT shall not be less than what is provided in the Step 7 Engineering Plans.

i. Alley on north side of Spring Street, Sta. 56+71.
ii. Alley on south side of Spring Street, Sta. 56+79.
iii. Drives on north side of Long Street, Sta. 52+59 and Sta. 58+20.
iv. Alley on south side of Long Street, Sta. 57+93.
v. McCoy Street intersection at Cleveland Avenue.

12. Changes in horizontal and vertical alignments shall comply with the design requirements listed in Section 10.5.2.
13. Any adjustments to the Step 7 Engineering Plans made by the DBT shall not preclude the need to address comments or incorporate commitments to the plans outlined in Sections 10.2.2 and 10.2.3.

10.2.5 Survey Requirements at Tie-in Locations

It is necessary for the DBT to field survey tie-in points at locations where the project meets existing pavements to obtain exact elevations and locations for these points. Adjustments may be necessary to the horizontal and vertical alignments to connect to these existing pavements in accordance to the geometric requirements contained in ODOT’s Manuals, Standards and this Section.

10.3 Roadway Criteria

The geometric design criteria shown below will apply to the roadways included in this project. Roadway classifications include mainline, ramps and city streets.

10.3.1 Mainline
Table 10-1: Mainline Design Designation

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Current Year ADT</th>
<th>Design Year ADT</th>
<th>Design Hourly Volume</th>
<th>Directional Distribution</th>
<th>Trucks (24-hr B+C)</th>
<th>Design Speed</th>
<th>Legal Speed</th>
<th>Design Functional Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-71</td>
<td>145,800</td>
<td>199,700</td>
<td>15,610</td>
<td>0.50</td>
<td>10%</td>
<td>60 mph</td>
<td>55 mph</td>
<td>Urban Interstate</td>
</tr>
<tr>
<td>I-670 EB</td>
<td>55,430</td>
<td>59,800</td>
<td>5,230</td>
<td>N/A</td>
<td>7%</td>
<td>60 mph</td>
<td>55 mph</td>
<td>Urban Interstate</td>
</tr>
<tr>
<td></td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>I-670 EB</td>
<td>67,750</td>
<td>81,400</td>
<td>7,150</td>
<td>N/A</td>
<td>7%</td>
<td>65 mph</td>
<td>65 mph</td>
<td>Urban Interstate</td>
</tr>
</tbody>
</table>

*West of I-71 ramps - See Table 10-4 for limits of Mainline designation.

**East of I-71 ramps – See Table 10-4 for limits of Mainline designation.

The ODOT Location and Design Manual, Volume 1 shall govern all horizontal, vertical and cross-sectional design elements of the mainline roadways, with the following exceptions and clarifications:

A. The minimum Decision Stopping Sight Distance (DSD) shall be 125% of the required minimum Stopping Sight Distance (SSD). See Section 10.2.4, Item 6.

B. The maximum allowable profile grade shall be 3% (Except where currently shown on the Step 7 Engineering Plans).

C. The minimum allowable vertical clearance shall be as described in Section 12.2.8.

D. The superelevation rate for the 65 mph section of I-670 EB listed in Table 10-1 shall match the existing superelevation rate through this section. The existing superelevation rate at this location meets a 55 mph design speed and requires a design exception (See Section 10.4)

10.3.2 Directional Roadways and Ramps

Table 10-2: Directional Roadway and Ramp Design Designations

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Current Year ADT</th>
<th>Design Year ADT</th>
<th>Design Hourly Volume</th>
<th>Directional Distribution</th>
<th>Trucks (24-hr B+C)</th>
<th>Design Speed</th>
<th>Legal Speed</th>
<th>Design Functional Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-670 EB</td>
<td>N/A</td>
<td>27,600</td>
<td>2,080</td>
<td>N/A</td>
<td>7%</td>
<td>55 mph</td>
<td>55 mph</td>
<td>Directional Roadway</td>
</tr>
<tr>
<td></td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Ramp V1</td>
<td>13,200</td>
<td>24,200</td>
<td>1,850</td>
<td>N/A</td>
<td>9%</td>
<td>Varies 30-45 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Roadway</td>
<td>Current Year ADT</td>
<td>Design Year ADT</td>
<td>Design Hourly Volume</td>
<td>Directional Distribution</td>
<td>Trucks (24-hr B+C)</td>
<td>Design Speed</td>
<td>Legal Speed</td>
<td>Design Functional Classification</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>----------------------</td>
<td>--------------------------</td>
<td>-------------------</td>
<td>--------------</td>
<td>-------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Ramp V2</td>
<td>N/A</td>
<td>56,500</td>
<td>4,260</td>
<td>N/A</td>
<td>9%</td>
<td>50 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp V3</td>
<td>23,900</td>
<td>32,300</td>
<td>2,480</td>
<td>N/A</td>
<td>9%</td>
<td>Varies 40-50 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp V5</td>
<td>N/A</td>
<td>4,100</td>
<td>400</td>
<td>N/A</td>
<td>2%</td>
<td>45 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp V6</td>
<td>N/A</td>
<td>8,100</td>
<td>820</td>
<td>N/A</td>
<td>2%</td>
<td>45 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp W1</td>
<td>N/A</td>
<td>24,500</td>
<td>2,710</td>
<td>N/A</td>
<td>2%</td>
<td>Varies 30-50 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp W2</td>
<td>10,900</td>
<td>17,500</td>
<td>1,050</td>
<td>N/A</td>
<td>4%</td>
<td>Varies 40-50 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp W3</td>
<td>N/A</td>
<td>11,200</td>
<td>1,250</td>
<td>N/A</td>
<td>2%</td>
<td>Varies 30-50 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp W4</td>
<td>1,800</td>
<td>1,700</td>
<td>190</td>
<td>N/A</td>
<td>3%</td>
<td>Varies 25-35 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp W5</td>
<td>3,300</td>
<td>8,500</td>
<td>860</td>
<td>N/A</td>
<td>9%</td>
<td>Varies 25-35 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp X1</td>
<td>3,800</td>
<td>6,200</td>
<td>540</td>
<td>N/A</td>
<td>7%</td>
<td>Varies 30-50 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp X2</td>
<td>N/A</td>
<td>2,500</td>
<td>270</td>
<td>N/A</td>
<td>3%</td>
<td>Varies 30-45 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp X3</td>
<td>11,500</td>
<td>24,800</td>
<td>2,790</td>
<td>N/A</td>
<td>9%</td>
<td>Varies 45-50 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp X4</td>
<td>15,100</td>
<td>12,900</td>
<td>1,060</td>
<td>N/A</td>
<td>10%</td>
<td>Varies 45-55 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td>Ramp X5</td>
<td>3,200</td>
<td>3,600</td>
<td>500</td>
<td>N/A</td>
<td>3%</td>
<td>Varies 30-45 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
</tbody>
</table>
March 2, 2011

The ODOT Location and Design Manual, Volume 1 shall govern all horizontal, vertical and cross-sectional design elements of the directional roadways and ramps, with the following exceptions and clarifications:

A. The minimum Decision Stopping Sight Distance (DSD) shall be 125% of the required minimum Stopping Sight Distance (SSD). See Section 10.2.4, Item 6.

B. The maximum allowable profile grade shall be 5%.

C. The minimum allowable vertical clearance shall be as described in Section 12.2.8.

D. DDHV is assumed to be greater than 250 vehicles per hour.

**10.3.3 City Streets**

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Current Year ADT</th>
<th>Design Year ADT</th>
<th>Design Hourly Volume</th>
<th>Directional Distribution</th>
<th>Trucks (24-hr B+C)</th>
<th>Design Speed</th>
<th>Legal Speed</th>
<th>Design Functional Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp X6</td>
<td>N/A</td>
<td>600</td>
<td>70</td>
<td>N/A</td>
<td>2%</td>
<td>45 mph</td>
<td>N/A</td>
<td>Ramp</td>
</tr>
<tr>
<td><strong>Table 10-3: City Street and Urban Collector Design Designations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*See Table 10-4 for limits of Directional Roadway designation.*
<table>
<thead>
<tr>
<th>Roadway</th>
<th>Current Year ADT</th>
<th>Design Year ADT</th>
<th>Design Hourly Volume</th>
<th>Directional Distribution</th>
<th>Trucks (24-hr B+C)</th>
<th>Design Speed</th>
<th>Legal Speed</th>
<th>Design Functional Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jack Gibbs Blvd.</td>
<td>8,300</td>
<td>15,600</td>
<td>1,520</td>
<td>0.72</td>
<td>5%</td>
<td>35 mph</td>
<td>35 mph</td>
<td>Urban Collector</td>
</tr>
<tr>
<td>Leonard Ave.</td>
<td>5,000</td>
<td>8,300</td>
<td>820</td>
<td>0.80</td>
<td>5%</td>
<td>40 mph</td>
<td>35 mph</td>
<td>Urban Minor Arterial</td>
</tr>
<tr>
<td>St. Clair Ave.</td>
<td>6,000</td>
<td>6,500</td>
<td>600</td>
<td>0.55</td>
<td>5%</td>
<td>40 mph</td>
<td>35 mph</td>
<td>Urban Collector</td>
</tr>
</tbody>
</table>

The ODOT Location and Design Manual, Volume 1 shall govern all horizontal, vertical and cross-sectional design elements of the urban collectors and city streets, with the following exceptions and clarifications:

A. The minimum allowable vertical clearance shall be as described in Section 12.2.8.

B. Minimum lane widths on all city streets shall be 11’, except on Cleveland Avenue which shall have one 12’ lane in each direction.

C. Bike lanes shall be provided at the following locations:
   - 5’ wide, adjacent to curb, west side of Southbound Urban Collector
   - 5’ wide, adjacent to curb, east side of Northbound Urban Collector
   - 4’ wide, between left turn lane and through lane of Northbound Urban Collector at Spring Street. See MUTCD Figure 9C-1 and Appendix RD-08
   - 5’ wide, adjacent to curb, north side of Spring Street (except east of the Northbound Urban Collector)
   - 5’ wide, adjacent to curb, south side of Long Street

D. A 14’ Shared-Use (sharrow) lane shall be provided along the north side of Spring Street adjacent to the curb east of the Northbound Urban Collector Street.

E. The minimum curbed shoulder width shall be 1’. In locations where a parking lane is provided, the curbed shoulder width shall be 8’.

F. Granite curbing shall be installed on the Northbound Urban Collector Street and the Southbound Urban Collector Street to the specifications and within the limits shown in Appendix AE-02.

G. A 6’ grass buffer and 6’ sidewalk shall be provided along the west side of the southbound Urban Collector Street and along the east side of the Northbound Urban Collector Street. A 10’ sidewalk shall be provided on both sides of Spring St. and Long St. between the Northbound and Southbound Urban Collector Streets. The sidewalk shall match the existing width along the remaining length of Spring St. and Long St. See Appendix AE-02 for details.
H. An 8’ wide parking lane shall be provided along the east side of the northbound Urban Collector Street. See Appendix RD-08 for conceptual layout.

I. A 7’ sidewalk shall be provided on the east side of Cleveland Avenue within the project limits as listed in Table 10-4 in Section 10.5.1.

J. A 15’ sidewalk shall be provided along the west side of Cleveland Ave. between McCoy St. and Jack Gibbs Boulevard.

K. A 10’ shared-use path shall be provided along the north side of Leonard Avenue within the limits of roadway work described in Table 10-4. The pavement shall be designed and constructed in accordance with the asphalt concrete pavement described in Section V of the ODOT Design Guidance for Independent Bicycle Facilities.

L. An 8’ wide parking lane with 7’ wide sidewalk adjacent to the curb shall be provided along the south side of Jack Gibbs Boulevard east of Cleveland Avenue. See Appendix RD-04 for conceptual layout.

M. The calculation required of horizontal clearance shall follow the recommended guidelines of ODOT L&D Figure 302-1E under "Lateral Clearance". The minimum value may be subject to adjustment with the need to provide intersection sight distance and horizontal stopping sight distance on the inside of curves. This offset would apply to walls, abutments, and piers as well as other fixed objects.

The following city street elements will be designed and constructed in accordance with City of Columbus Standard Drawings, included in Appendix RD-06:

1. 2000 - Straight 18” Concrete Curb, Item 609
2. 2010 - Standard Concrete Combined Curb & Gutter, Item 609
3. 2150 - Typical Alley Intersection, Item 452 Type I & II
4. 2151 - Typical Alley Paving Section, Item 452
5. 2160 - Pavement Replacement (Driveways)
6. 2201 - Standard Residential Driveways on Public R/W
7. 2202 - Standard Commercial Driveway on Public R/W
8. 2220 - Driveways - Commercial, Multiple Dwelling, or School: Type A, B or C
9. 2300 - Standard Sidewalks, Item 608 and Specifications
10. 2303 - 8” Concrete Walk Limits at an Intersection with an Arterial Street
11. 2304 - Concrete Sidewalk behind the Curb at Intersections
12. 2319 - Standard Wheelchair Ramps
13. 2330 - Left In & Right In with Right Out
14. 2332 - Concrete Bus Pad
15. Supplemental Specification 1551 – Detectable Warnings

ODOT Standard Construction Drawings shall govern any additional city street elements to be designed and constructed that are not included in the list above.

City Street elements which have exposed concrete for City of Columbus Construction and Material Specifications Items 451, 452, 608, 609, and 612 shall utilize Class S Opt 2 concrete (as per City of Columbus Standard Drawings, included in Appendix RD-06).
Columubs C&MS). The concrete material for each of these items of work shall be changed to match the specification of Item 499, Class S, Option 2. For Class S, the Maximum Water/Cement ratio is 0.44. For any work that is slip-formed by a self-propelled machine, the material shall meet the specification called out in that respective item number in the City of Columubs C&MS. Any items that specify the use of Class MS or FS will not require this change in material.

10.3.4 Transition Pavement
The DBT shall design and construct transition pavement between the proposed mainline roadways and ramps in the I-71/I-670 Interchange and the existing I-71 pavement as shown conceptually in Appendix GN-01. The transition pavement shall be designed at 55 mph and meet the requirements of the ODOT Location and Design Manual, Volume 1, for all horizontal, vertical and cross-sectional design elements. The transition pavement composition shall meet the requirements of the flexible pavement option provided in Appendix PV-01.

10.3.5 Concrete Traffic Barriers
New concrete traffic barriers shall be sealed with epoxy-urethane sealer (Federal Color #17778).

10.4 Design Exceptions

The following design exception has been approved for this project:

1. **Superelevation** – Mainline I-670 EB from Sta. 109+34 to Sta. 126+69.91 (design speed 65 mph) shall be designed and constructed to match the superelevation rate of existing I-670 (approximately 55 mph) within these limits.

A copy of this design exception has been provided in Appendix RD-10. No additional design exceptions will be permitted.

10.5 Project Requirements

10.5.1. Approximate Project Limits

The approximate project limits are listed in Table 10-4.

<table>
<thead>
<tr>
<th>Table 10-4: Approximate Project Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Approximate Project Limits</strong></td>
</tr>
<tr>
<td>are as follows (based on stationing on Step 7 Plans):</td>
</tr>
<tr>
<td><strong>Mainline</strong></td>
</tr>
<tr>
<td>Transition Pavement Mainline I-71 Northbound</td>
</tr>
<tr>
<td>Transition Pavement to I-670 Eastbound</td>
</tr>
<tr>
<td>Proposed Mainline I-71 Northbound</td>
</tr>
<tr>
<td>Transition Pavement Mainline I-71 Southbound</td>
</tr>
<tr>
<td>Transition Pavement to SB Exit Ramp to Broad St</td>
</tr>
<tr>
<td>Proposed Mainline I-71 Southbound</td>
</tr>
<tr>
<td>Proposed Mainline I-670 Eastbound</td>
</tr>
<tr>
<td>Proposed Mainline I-670 Eastbound</td>
</tr>
</tbody>
</table>
Approximate Project Limits are as follows (based on stationing on Step 7 Plans):

<table>
<thead>
<tr>
<th>Ramps &amp; Directional Roadways</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Directional Roadway I-670 Eastbound</td>
<td>512+00 to 561+65</td>
</tr>
<tr>
<td>Ramp V1 - Ramp V2 to Leonard Ave.</td>
<td>1000+45 to 1011+15</td>
</tr>
<tr>
<td>Ramp V2 - I-71 NB to I-670 EB</td>
<td>1108+32 to 1152+83</td>
</tr>
<tr>
<td>Ramp V3 - I-71 NB to I-670 WB</td>
<td>1200+90 to 1238+38</td>
</tr>
<tr>
<td>Ramp V5 - Ramp V6 to Ramp V2</td>
<td>1401+86 to 1410+56</td>
</tr>
<tr>
<td>Ramp V6 - Spring St to I-71 NB</td>
<td>1500+80 to 1513+50</td>
</tr>
<tr>
<td>Ramp W1 - I-71 SB to Spring St.</td>
<td>1600+38 to 1629+32</td>
</tr>
<tr>
<td>Ramp W2 - I-670 WB to I-71 SB</td>
<td>1700+60 to 1727+50</td>
</tr>
<tr>
<td>Ramp W3 - I-670 WB to Spring St.</td>
<td>1801+01 to 1823+88</td>
</tr>
<tr>
<td>Ramp W4 - Ramp W3 to Jack Gibbs Blvd.</td>
<td>1900+11 to 1911+24</td>
</tr>
<tr>
<td>Ramp W5 - Jack Gibbs Blvd. to I-670 WB</td>
<td>2000+13 to 2004+95</td>
</tr>
<tr>
<td>Ramp X1 - I-670 EB to Cleveland Ave</td>
<td>2100+00 to 2110+42</td>
</tr>
<tr>
<td>Ramp X2 - Cleveland Ave to Ramp X3</td>
<td>2200+42 to 2219+33</td>
</tr>
<tr>
<td>Ramp X3 - I-670 EB to I-71 SB</td>
<td>2302+27 to 2342+52</td>
</tr>
<tr>
<td>Ramp X4 - I-670 EB to I-71 NB</td>
<td>2400+52 to 2430+17</td>
</tr>
<tr>
<td>Ramp X5 - Cleveland Ave to Ramp X4</td>
<td>2500+51 to 2512+45</td>
</tr>
<tr>
<td>Ramp X6 - Ramp X4 to I-670 EB</td>
<td>2600+61 to 2614+86</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>City Streets</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Northbound Urban Corridor Street</td>
<td>329+67 to 335+10</td>
</tr>
<tr>
<td>Southbound Urban Corridor Street</td>
<td>323+08 to 328+52</td>
</tr>
<tr>
<td>Long Street</td>
<td>52+00 to 59+21</td>
</tr>
<tr>
<td>Spring Street</td>
<td>50+00 to 58+00</td>
</tr>
<tr>
<td>Cleveland Avenue</td>
<td>52+50 to 61+51</td>
</tr>
<tr>
<td>Jack Gibbs Blvd. (widening)</td>
<td>50+73 to 55+50</td>
</tr>
<tr>
<td>Jack Gibbs Blvd. (full reconstruction)</td>
<td>72+00 to 78+00</td>
</tr>
<tr>
<td>Leonard Avenue</td>
<td>10+00 to 17+59</td>
</tr>
</tbody>
</table>

10.5.2 Roadway Design

In addition to the governing regulations per Section 1.14 and Section 10.1, the DBT shall adhere to the following requirements:

A. For directional roadways or ramps with three (3) or more lanes, the left shoulder width (in direction of travel) shall be set equal to the right shoulder width.

B. For multi-lane directional roadways or ramps with two (2) or more lanes, curve widening shall be provided in accordance with ODOT L&D, Volume 1 Figure 301-5cE.
C. For all curved alignments, horizontal stopping sight distance shall be provided in accordance with ODOT L&D, Volume 1, Figure 201-2E. Where necessary to attain the required sight distance for roadways with unequal shoulder widths, the wider shoulder shall be placed on the inside of the curve. Additionally, if necessary to attain the required horizontal sight distance, the inside shoulder shall be widened up to a maximum of 12 feet.

D. For consecutive entrance/entrance or exit/exit ramps, the terminal area of one ramp shall not overlap the terminal area of the succeeding ramp. The terminal area is from the beginning or ending of the taper to the physical nose as shown on Figure 503-1a of the L&D, Volume 1.

E. Ramp grades shall not exceed 5 percent.

F. For loop ramp horizontal curves, the minimum radius allowed for a 25 mph design speed is 150 feet.

G. The beginning of a ramp diverge shall be located a minimum of 100 feet from a preceding intersection.

H. The minimum offset on city streets for vertical obstructions not essential to the roadway design (trees, planters, etc.) shall meet the requirements of Section 600.2.2 of the L&D Volume 1.

I. Provide a minimum offset of two (2) feet from the back of proposed sidewalk to the slope break point of any back slope 6:1 and steeper.

J. For Stop Condition crossroad profiles as shown in L&D Volume 1, Figures 401-2 and 401-3, the maximum allowable grade in the intersection area shall not exceed 3.60%.

K. ADA-compliant curb ramps shall be provided at all corners of all intersections within the project limits according to the ODOT L&D Manual Volume 1, Section 306. Exceptions to curb ramp locations include corners where pedestrian movements are not permitted.

Curb ramps shall be designed per City of Columbus Standard Drawing No. 2319 - Standard Wheelchair Ramps. Ramps shall be a minimum of 4’ wide. 10’ wide ramps shall be provided at the Cleveland Avenue/Jack Gibbs Boulevard intersection, the Cleveland Avenue/I-670 off-ramp (Ramp X1) intersection and the northwest corner of the Cleveland Avenue/McCoy Street intersection.

See Appendix RD-05 for proposed curb ramp locations and types on Cleveland Avenue.

See Appendix AE-02 for proposed curb ramp location and types on Spring Street and Long Street.

L. The DBT shall be responsible for guardrail and concrete barrier design and construction per ODOT L&D Volume 1, Section 600. The length, type and need for roadside barrier shall be designed in accordance with the ODOT L&D, Volume 1, Section 600. Where warranted, barriers in the median shall be a modified Single Slope Barrier, Type D with a height of 57 inches. For incorporated installations, the minimum horizontal top of barrier dimension shall be 12 inches. The conduits required by other Sections (lighting, ITS, Columbus Traffic Signal System – phase A, etc.) shall be included in the barrier. The details shown in ODOT Standard Construction Drawing RM-4.5 shall be modified accordingly.

M. Radius returns at intersections on Cleveland Avenue shall be designed and constructed to the dimensions shown in the Intersections Details provided in the Step 7 Engineering Plans in Appendix RD-03.
Radius returns at intersections on Spring Streets and Long Street shall be designed and constructed to the dimensions shown in the details provided in Appendix AE-02.

N. In order to prevent left turns in and out of McCoy Street at Cleveland Avenue, a raised concrete median shall be designed and constructed from approximately Sta. 57+18 to Sta. 57+81. The proposed median may be bordered with Straight 18” Concrete Curb (per City of Columbus Std. Dwg. 2000) or installed as a single concrete placement. The face of proposed curb/median shall be offset 1’ from the proposed lane lines. At its widest point, the proposed median shall be 9’ wide. See the Step 7 Engineering Plans provided in Appendix RD-03 for general location and layout information.

O. A raised concrete median with pedestrian pass-through shall be designed and constructed on Cleveland Avenue at Grove Street from approximately Sta. 53+67 to Sta. 54+39. The 6’ wide pedestrian pass-through shall be provided in line with the proposed crosswalk. The proposed median may be bordered with Straight 18” Concrete Curb (per City of Columbus Std. Dwg. 2000) or installed as a single concrete placement. The face of proposed curb/median shall be offset 1’ from the proposed lane lines. At its widest point, the proposed median shall be 9’ wide. See the Step 7 Engineering Plans provided in Appendix RD-03 for general location and layout information.

P. A Left In & Right In with Right Out shall be designed and constructed at Jefferson Avenue where it intersects with Cleveland Avenue. The design and construction of the median island shall be consistent with City of Columbus Std. Dwg. 2330, although the median island dimensions may vary due to the narrower width of Jefferson Ave. and the reduced radii on the proposed radius returns (See Note N above). The median island shall be designed to accommodate a single unit truck (AASHTO 2004 vehicle SU). See the Step 7 Engineering Plans provided in Appendix RD-03 for general location and layout information.

Q. Willow Alley at Spring Street shall be closed as part of this project. Proposed brick sidewalk (as shown in Appendix AE-02) shall be constructed in place of the existing opening and connected to existing sidewalk west of the alley. The portion of the brick sidewalk within the limits of Willow Alley shall be constructed per City of Columbus Standard Drawing 2301 and include 8” thick concrete base to accommodate potential emergency vehicle traffic.

R. In gore locations between diverging roadways where an impact attenuator system is required, the lateral sides of the attenuator system shall not encroach upon the adjacent roadway shoulders and in no case shall be closer than 6’ to the edge of either traveled lane. The nose of the selected attenuator system shall not encroach into the striped gore area between the diverging roadways.

S. At the back of gore areas between diverging roadways, the 24-foot dimension on common paved shoulder area as shown in Figures 505-2a, -2b, and -2c of Volume 1 of the L&D Manual shall include any required curve widening on adjacent roadways.

10.6 Record Engineering Plans

Record Engineering Plans for the I-71/I-670 interchange area have been provided in Appendix RD-07 for reference. Plans have been provided for the following projects:

- FRA-3-16.69
- FRA-3-16.91
- FRA-3-17.17
- FRA-70-3.82, 71-16.83
- FRA-71-17.75
- FRA-670-3.17
- FRA-670-3.17 (Retaining Wall)
- FRA-670-3.80, Part 2
- FRA-670-3.93
- FRA-670-3.93-I
- FRA-670-3.93-R
- FRA-670-3.93-RR
- FRA-670-3.93-RW
- FRA-670-3.93-U
- FRA-670-4.36 (Jack Gibbs Bikeway & R/W)
- FRA-670-4.91
- FRA-670-5.19
- FRA-670-5.61
- FRA- St. Clair Avenue Bridge
11 Drainage

11.1 Governing Regulations for ODOT Facilities

All plans and design for the Department’s facilities shall be prepared in accordance with the latest standards provide in Section 1.14. The Department’s drainage facilities are considered to be those items that the Department owns and maintains after construction. This is based on maintenance responsibility for the respective roadway. A list of roadways and their respective maintaining agencies is available in Section 1.7.

In the event of a conflict among the standards listed related to drainage, the Department’s standards shall take precedence. For drainage components not addressed by the standards listed, other guidelines or specifications that reflect currently accepted industry practice can be used as agreed to by the Department.

11.2 Governing Regulations for Local Facilities

All plans and design for local facilities shall be prepared in accordance with the latest standards provided in Section 1.14. Local drainage facilities are considered to be those items that the local public agency owns and maintains after construction. This is based on maintenance responsibility for the respective roadway. A list of roadways and their respective maintaining agencies is available in Section 1.7.

For drainage components not addressed by the standards listed, other guidelines or specifications that reflect currently accepted industry practice can be used as agreed to by the Department.

11.3 Notes and Specifications

A. Any proposed storm sewers outside of Department’s right-of-way that is not receiving storm water conveyance from within Department’s right-of-way shall follow the City of Columbus Storm Water Drainage Manual, City of Columbus CMS and City of Columbus Standard Construction Drawings. Any proposed storm sewers within the Department’s right-of-way that outlet to a city storm sewer shall follow ODOT’s L&D Manual Volume 2 – Drainage Design, ODOT’s CMS and ODOT’s Standard Construction Drawings. Any storm water design for bridges shall follow ODOT’s L&D Manual Volume 2 – Drainage Design, ODOT’s CMS, structures reference section 12.2.7 (drainage systems) and ODOT’s Standard Construction Drawings.

B. Items associated with monument assemblies, reference monuments, right-of-way monuments, and any other items associated with monuments shall be constructed in accordance with ODOT’s CMS item 604.

C. The DBT may use ODOT’s supplemental specification SS802 for constructing and inspecting the Department’s storm sewer system and drainage structures. The DBT shall use the City of Columbus CMS for constructing and inspecting the City’s storm sewer system and drainage structures.

D. The DBT shall review and follow the appropriate sample plan notes provided in ODOT’s L&D Manual, Volume 2 Drainage Design, Appendix B.
E. Any storm sewer conduits located in or under any MSE walls shall use reinforced concrete pipe per ODOT’s CMS item 706.02 with resilient and flexible gasket joint per ODOT’s CMS item 706.11 with the following additions:
   i. Conduits shall have integral bell gasket joint
   ii. The backfill and bedding shall meet the requirements of the wall embankment material.
   iii. The trenching and backfilling requirements of ODOT’s CMS section 603 may be waived when used at locations where MSE wall backfill requirements are being applied.
   iv. Conduit construction shall be performed in corporation with MSE wall construction.

11.4 Requirements

11.4.1 Structure Drainage
The bridge deck drainage design shall conform to ODOT’s L&D Manual Volume 2 Drainage Design, section 1103, section 1113.

At the Spring Street Bridge and Long Street Bridge, the DBT shall refer to Appendix AE-02, the Spring and Long Street Bridge Landscape Enhancement Plan, for the proposed drainage design, plan sheets, details, and specifications. Drainage calculations were performed based on ODOT’s Location and Design Manual Volume 2 requirements and the LD-35 provided in Appendix DR-01. The calculations, including a brief narrative providing assumptions, permeability information for proposed materials, and flow rates, are provided in Appendix AE-02.

A dual system of underdrains and a continuous drainage mat shall be provided. The underdrains shall be placed under all lawn and planting areas with a 6” layer of porous backfill; the underdrain will rest on top of the continuous drainage mat. The continuous drainage mat shall continue beyond the planting areas under paved areas as detailed in Appendix AE-02.

The continuous drainage mat shall conform to specifications provided in the landscape plan notes. See Appendix AE-02 for notes.

Waterproofing membrane shall be provided between the drainage mat and the bridge deck. At joint locations (i.e. planter walls, foundations, etc), the waterproofing membrane shall be wrapped vertically over the joint and continue to the top of the element, per the details in Appendix AE-02. Water stops shall also be provided at the parapet wall, and under the stairs.

The underdrains and drainage mat shall follow the profile grade of the bridges. No transverse slope will be provided to either system. Both systems will outlet at the ends of the bridges into an outlet structure as detailed in Appendix AE-02. The runoff shall be collected into several outlet pipes as shown in the details and conveyed off of the structure. The DBT shall be responsible for designing the tie in from these outlets to the proposed storm sewer system described in Section 11.4.2. The DBT shall not cross the roadway with an outlet within the structure limits.
At lighting pole foundations within lawn or landscaped areas that conflict with the underdrain system, the DBT shall use a series of bends to maintain a 2’ offset from the base of the foundation.

Cleanouts shall be provided at the locations designated in the drainage plan sheets in Appendix AE-02. Cleanouts shall be constructed of a matching pipes size for the underdrain it is connecting to and fit within a 6” sleeve as shown in the drainage plan sheets. The cap of the cleanout sleeves shall be green and constructed flush with the lawn or planting bed area. The cap shall be marked “CLEANOUT”. Cleanouts will also be provided on the outlet structure, located directly over the outlet pipes. These cleanouts shall be constructed to match the size shown in the outlet structure details and shall fit within a 10” sleeve as shown in the drainage plan sheets. The cap of the 8” cleanout sleeve shall be green and constructed flush with the lawn or planting bed area. The cap shall be marked “CLEANOUT”. During construction, the DBT shall be required to clean the underdrain system as necessary to prevent clogging due to debris. The DBT shall provide the City of Columbus with a maintenance schedule at the end of construction.

Yard drains shall be provided within the lawn area on the south side of the Long Street Bridge as shown in the drainage plan sheets in Appendix AE-02. A non-perforated pipe shall connect the yard drains to the outlet structures. The grates of the yard drains shall be ADA compliant, Ironworks Market Street Grate (9053DR) 12” x 12” cast iron grate powder coated black or approved equal. When constructing the yard drains, the DBT shall maintain a 3” depression below proposed grade to the top of the grate. See the detail in Appendix AE-02 for more information on materials and construction.

The DBT shall provide scuppers within the roadway on both bridges as shown in Appendix AE-02. On the southern side of Spring Street, the scuppers shall be located outside of the travel lane. The edge of traveled way for the 11’ lane shall be striped with an edge line. Scupper details are provided in the Appendix.

11.4.2 Storm Sewer Design

The existing roadway drainage within the project area is primarily conveyed through a dedicated roadway storm sewer system which outlets into a local City of Columbus sewer system. No connection made to the existing sewer network of the City of Columbus shall incur a net increase in peak flows in the 10 year design storm. Also, no connection made to the existing City of Columbus combined sewer system shall incur a net increase of peak flows for a 1-year design storm.

Refer to Appendix DR-02, DR-03, and DR-04 for the existing condition hydrology report for the pre-construction peak flow rates to the City’s sewer system, the Preliminary Proposed Storm Sewer System with the post-construction peak flow rates to the existing City’s sewer system, and the Second Street Storm Sewer Outlet Report.

Unless otherwise identified within the project scope, no proposed discharge to the City’s existing combination sewer system will be allowed. (Sec 11.4.5).

A. The proposed ODOT storm sewers that tie into the City’s existing combination sewer system at Spring Street, Washington Avenue and Buckingham Avenue and into the standard storm sewer system at Cleveland Avenue and Second Street shall not exceed the following 10 year frequency storm flows in the DBT design. (Refer to Appendix DR-03 and Appendix DR-04):

a. Washington Avenue = 3 cfs: No proposed ODOT storm sewer connections allowed.

b. Buckingham Avenue = 18 cfs: No proposed ODOT storm sewer connections allowed.
c. Spring Street = 128 cfs: Minimize proposed ODOT storm sewer connections.

d. Cleveland Avenue = 17 cfs: Minimize proposed ODOT storm sewer connections.

e. Second Street = 426 cfs: Maximize proposed ODOT storm sewer connections.

B. If the DBT exceeds the flows indicated in 11.4.2 (A) to the existing sewer system, this shall require the approval of ODOT and the City of Columbus.

C. The DBT shall raise catch basins, inlets and manholes as necessary to accommodate resurfacing.

11.4.3 Stormwater Best Management Practices (BMP’s)

Post-construction storm water Best Management Practices (BMP’s) shall be provided by others as part of the larger plan of development for the I-70/I-71 South Innerbelt Study. The DBT shall not design and shall not construct post-construction storm BMPs which would require future maintenance by the Department. The DBT shall provide the following information for use by others in the design of the post-construction BMP’s:

A. Prepare calculations and drainage area mapping for post-construction BMP’s.

B. Storm sewers reconnected to the combined sewer system do not require post-construction BMP’s.

Nothing in this section alters the requirement of the DBT to obtain coverage for this project under the Ohio EPA NPDES General Permit for Storm Water Discharge from Small and Large Construction Activities (OEPA Permit #OHC000003), as well as compliance with all requirements of said permit.

11.4.4 Drainage Structure and Pipe Cleanout

The DBT shall remove sediment and debris from the existing drainage conduits and existing drainage structures that will remain in place as part of the final design and construction. All materials removed shall be disposed of as per ODOT’s CMS item 105.16 and 105.17. All sewers shall be cleaned out to the satisfaction of the Department.

11.4.5 Microtunnel

In order to drain a low point in the I-670/I-71 Interchange in the area of Ramp V3 from station 1206+00 to station 1212+00 and to re-route ODOT’s storm sewers from existing City’s combinations sewer systems at Washington Avenue (Columbus State) and Buckingham Avenue, the DBT shall design and construct a storm sewer using microtunnel construction procedures from junction 700 (just south of E. Main Street) to junction 723 (just north of Spring Street). The DBT shall not consider a pump station as a viable means to drain the low point in the I-670/I-71 Interchange. The minimum pipe size for the tunnel shall be 54”. Refer to Appendix DR-03 Preliminary Storm Sewer Report.

For Microtunnel construction only, required manhole spacing per ODOT’s Location and Design Manual Volume 2 –Drainage shall not apply. Manholes shall only be required at each micro- tunneling (jacking/receiving) pit and at each abrupt change in horizontal or vertical alignment. Additional manholes may be installed as determined by the DBT’s means and methods.

See Appendix DR-03 for preliminary microtunnel plan and profile. All pit locations shall require the approval from ODOT Office of Structural Engineering, Hydraulics Unit (David Riley, P.E.).
The DBT shall show in plan the maintenance of traffic provisions necessary to complete the microtunnel operations. Refer to Section 16.7 for freeway closures and Section 16.8 for ramp closures when developing all aspects of the microtunneling plans. The jacking and receiving pits, including the work area around the pits, shall at all times be protected from traffic.

The contractor shall use jacking pipe specifically designed for microtunneling applications. The pipe specified by the DBT shall be from a pipe manufacturer experienced in microtunnel pipes. The DBT shall submit a detail analysis of the pipe they selected showing the stresses the pipe is capable of handling during microtunneling and jacking operations and to demonstrate when and if intermediate jacking stations are required.

The DBT shall provide temporary restrictor plates in the microtunnel section as needed to control the storm water release rate at Second Street. Refer to Appendix DR-04 for preliminary design discussion and calculations.

See the Geotechnical Section 8 for microtunnel construction and design requirements. For soil boring information along the tunnel alignment, refer to Appendix GE-03.

The DBT shall verify with ODOT and its consultants that the tunnel alignment does not conflict with any proposed structures from FRA-71-17.14, Project 3, I-71 East Trench and FRA-70-14.48, Project 2, East Interchange. The DBT shall supply ODOT with current tunnel alignment information so it can be shown in the construction documents for Project 2 & 3.

All areas outside the project limits which are disturbed by the construction of the microtunnel shall be restored back to their original condition, as per ODOT Construction & Material Specifications (CMS). This includes all jacking pits, receiving pits, slopes, retaining walls, utilities, and storm sewers. This restoration shall be performed within 60 days of the time that the microtunnel construction is complete at each pit location and cut location.
12 Structures

12.1 Governing Regulations

Governing regulations are listed in Section 1.14 and supplemental specifications are listed in Section 1.15. For cases where AASHTO Specifications conflict with ODOT Manuals or Standards, ODOT’s Manuals or Standards shall take precedence. For structural components not addressed by the standards listed in Section 1.14, other guidelines or specifications that reflect currently accepted industry practice can be used as agreed to by the Department.

All locations in the ODOT Bridge Design Manual (BDM) not identified below or not otherwise restricted or clarified in the Project Scope, noted as “Consult with the Office of Structural Engineering” do not require a consultation with ODOT office of Structural Engineering.

12.2 General Bridge Criteria

These criteria apply to all bridges that support roadway traffic as well as to the Long Street cap.

All bridges in this project shall be completely new construction except for:

- Bridge number FRA-71-1835L (SFN 2507749 – Ramp W1 over Jack Gibbs Blvd.), which shall be widened or replaced with a new structure. Providing a new reinforced concrete deck, replace the forward and rear backwalls down to the beams seats, and widening of this bridge is a minimum requirement. Replace the forward and rear approach slabs. If the FRA-71-1835L structure is to be widened, then the proposed structure shall be analyzed/evaluated as per section 4 of the ODOT’s BDM 2004 edition. The DBT may elect to build a new bridge.

- Bridge number FRA-71-1835R (SFN 2507773 - I-71 Northbound and Ramp X4 over Jack Gibbs Blvd.), which shall receive a new overlay. The overlay work shall be as follows: remove the existing 1 1/4” Latex Modified Concrete overlay, remove 1” of the top of the concrete deck via hydro-demolition, then replace with 2 1/4” Micro Silica Modified or Superplasticized Dense Concrete (SDC) overlay as per Supplemental Specification 848 dated 4/16/2010. The forward and rear backwalls shall be replaced down to the beams seats. The forward and rear expansion joints shall be replaced. Replace the forward and rear approach slabs.

See Section 1.11 for construction noise specifications and Section 8.3.5 for vibration monitoring and control requirements.

Bridges carrying Interstate to Interstate ramp traffic shall be considered as Interstate bridges for Fatigue Resistance as per section 1006 S6.6.1.2.5.

FHWA-50-52-3349. In addition, Structure No. FRA-71-1784B (Northbound C-D and Spring Street over Ramp V2) shall conform to Section 6.9.1.

Conform to “Connection Details for Prefabricated Bridge Elements and Systems” FHWA-IF-090919 for details on connecting bridge prefabricated elements.

Refer to Section 15.6 for lighting requirements.

Refer to Section 6 – Utilities, for fire protection and stand pipes in the trench area.

Bridges that support soils shall be designed for saturated soil unit weights.

No permanent wood structural elements will be allowed.

Structure No. FRA-71-1784B shall provide the necessary support for the Northbound C-D (Elijah Peirce Avenue), Spring Street, and the landscape included in the Spring Street and Long Street Bridge Landscape Enhancement Plans (Appendix AE-02). Ramp V2 is to be completely covered from the west side of the Northbound C-D to the north side of Spring Street.

\[12.2.1 \textbf{Foundations}\]

Bridge foundations shall conform to the provisions of Section 8 – Geotechnical, including appendices, in addition to the requirements of this section.

Drilled shafts that develop their load carrying capacity through skin friction and end bearing in soil shall be permitted. The capacity developed by the drilled shaft shall be determined in accordance with the requirements of AASHTO LRFD Bridge Design Specifications.

For drilled shafts, the minimum clear distance for longitudinal and lateral reinforcement shall not be less than five (5) times the maximum aggregate size.

Large diameter pipe piles are acceptable.

A substructure foundation with less than four drilled shafts shall be considered non-redundant. For a substructure foundation with less than four drilled shafts, a 20% capacity reduction factor shall apply to each drilled shaft.

Under-reamed or belled drilled shafts are not permitted.

One demonstration drilled shaft is required for the project for the purpose of the verifying construction procedure. See Appendix GE-07 for the demonstration drilled shaft specifications.
Auger-cast piles, or continuous flight auger (CFA) piles, are not permitted. Timber piles are not permitted.

Perform a drivability analysis using the wave equation method to select the pile driving impact hammer for installing the piles to the required ultimate bearing value.

When new embankment is constructed over a compressible layer of soil and long-term settlement is anticipated, the possibility of down-drag loads on the piles shall be considered. The potential down-drag load shall be computed according to AASHTO LRFD Bridge Design Specifications.

The drilled shaft maximum resistance factor shall be limited to 0.6 for any testing method.

12.2.2 Substructures

All substructures shall be Cast-In-Place reinforced concrete or pre-cast reinforced concrete. Refer to Section 14 Aesthetics and Enhancements for substructure aesthetic enhancements design.

Steel box beam pier caps are not permitted.

Capped pile type piers are not permitted.

New cap and column piers shall have a minimum of three columns when completed, except where geometric constraints require the use of straddle bents. During phased construction of cap and column piers each phase shall be supported on at least two columns.

12.2.3 Preliminary Structure Type Studies

Preliminary abbreviated Structure Type Studies have been completed as part of Step 7 activities for this project. These studies identify conceptual structure type and span arrangements at each site. This information is included in Appendix ST-03 and can be used at the discretion of the DBT.

Design FRA-71-1777, FRA-71-1779 and FRA-71-1790 in accordance with Structure Type Studies found in AE-02. Deviations in final elevations and grade adjustments are allowed, subject to the requirements of all other scope sections.

12.2.4 Superstructure

The following structure types are permitted:

A. Rolled steel beam or welded steel plate I-girder with Cast-In-Place reinforced concrete deck.
B. Precast prestressed/pretensioned concrete bulb-tee or I-girder (not restricted to ODOT standard I girder shapes) with Cast-In-Place reinforced concrete deck.

All other structure types require an ATC to be considered as per the Design Build Selection Criteria.

Utilization of ground supported falsework for superstructure construction is not permitted.
The use of precast prestressed concrete box beams is not permitted.

Non-redundant designs are not permitted, except for straddle bents where necessary.

Precast reinforced concrete three sided flat topped culverts or arched sections shall not be used as traffic tunnels or as grade separation structures.

Structure designs that require fracture critical members are not permitted except for straddle bent.

Single lane ramp bridges with stringer/girder type superstructure shall have a minimum of four (4) stringer/girder lines when completed. All other bridges with stringer/girder type superstructure shall have a minimum of five (5) stringer/girder lines when completed. Fewer than five stringer/girder lines may be acceptable under a phase of part-width construction.

For haunched girders, the intersection of the flat bottom flange bearing seat area and the curved section of the bottom flange shall be detailed as two plates with a full penetration weld.

Skewed cross-frames at intermediate support points are not permitted.

For the steel ductility requirements of AASHTO LRFD Article 6.10.7.3, the design haunch shall not be included in the determination of D_p and D_t.

For all steel girder bridges with a web depth of 5’-6” or greater, provide inspection hand-hold rod on both sides of all girders, except on the outside of fascia girder.

The hand-hold rod and all associated supports and attachments shall be galvanized steel according to C&MS 711.02.

Precast prestressed/pretensioned concrete I-beams shall have a minimum web thickness of 8-inches.

Elastomeric bearings shall be designed based on a selected durometer of either 50 or 60. Field welding of a beam or girder to the bearing load plate shall be controlled so that the temperature that the elastomer is subjected to does not exceed 300°F.

In addition to general design criteria, all bearing devices shall be designed to accommodate any lateral deflection of wall type abutments that occurs after the superstructure is erected.

AASHTO LRFD Bridge Design Specifications have both a design and construction section for pot type bearings, disc type bearings and spherical type bearings. The DBT shall use these LRFD sections and the current BDM as a guide in designing, selecting and specifying these bearing types.

All new structural steel shall be painted using IZEU coating system. The urethane top coat shall be tinted to meet Federal color # 14062 (Dark Green).
All new concrete beams shall be sealed with epoxy-urethane sealer with the limits as per 12.2.14. The urethane top coat shall be tinted to meet Federal color #14062 (Dark Green).

All existing structural steel salvaged and re-used in bridges being widened with new structural steel shall receive a new paint coating system using OZEU. The urethane top coat shall match the color of the new steel’s coating system IZEU.

All existing structural steel in bridges that receive a new overlay shall receive a new paint coating system using OZEU. The urethane top coat shall be tinted to meet Federal color #14062 (Dark Green).

The moment redistribution provisions of AASHTO LRFD Bridge Design Specifications Appendix B will not be allowed.

The entire limits of each structure shall have a consistent superstructure material (steel or concrete).

Items cast into prestressed concrete beams to facilitate bridge construction shall be galvanized or epoxy coated.

The DBT shall prepare and submit a detailed structure grounding plan for each structure to the IQF for acceptance. The grounding plan shall include grounding of all metal items and appurtenances on all structures, including any and all decorative items. The grounding system shall include redundancy. At a minimum, the grounding plan shall include items to be grounded, laterals, and jumpers. The grounding plan shall be prepared in accordance with SCD HL-50.21, with additional information as needed to provide a complete and acceptable grounding plan.

FRA-71-1777 and FRA-71-1779 (Long Street South Cap and Long Street) shall be 2-span steel girder bridges.

The following additional provisions apply to the FRA-71-1777 (Long Street South Cap) structure:

2. A refined methods shall be used for the analysis of the bridge as described in AASHTO LRFD Article 4.6.3 and accompanying Commentary. At a minimum the bridge modeling shall recognize both the girders and crossframes.
3. The Pedestrian Live Load may be taken as 65 psf.
4. Two general loading conditions shall be considered. The first loading condition includes the final landscape design. Actual loads for this condition are not given but shall be determined by the DBT from the plan details (Appendix AE-02). The second loading condition includes the alternate uniform and concentrated loads and deflection criteria given on the plans, as the only loading above the concrete deck slab (Appendix AE-02). The bridge components shall be designed for the more critical of the two loading conditions. The only exception is that the deck slab need not be checked for capacity to carry the alternate concentrated loads since future modification to add steel transfer diaphragms is expected to support these loads. The girders shall be cambered for only the first loading condition.
12.2.5 Deck
All bridge decks shall be full depth cast-in-place concrete.

Precast concrete deck forms (panels) are not permitted.

Full depth precast concrete deck panels are not permitted.

Stay-In-Place deck forms are not permitted.

Bituminous type wearing surfaces are not permitted.

12.2.6 Expansion Joints
The use of expansion joints shall be kept to a minimum. All expansion joints shall be sealed from bridge deck surface drainage. Open-type joints that accept bridge deck surface drainage, such as finger joints, are not permitted.

Expansion joints shall be located at substructure units only.

The following structures shall have expansion joints located between the bridge deck and the abutment backwall:

- FRA-071-1777 (I-71 under Long Street South Cap).
- FRA-071-1779 (I-71 under Long Street).
- FRA-071-1790 (I-71 under Spring Street).
- FRA-071-1784B (Northbound C-D and Spring Street over Ramp V2).

FRA-71-1777 and FRA-71-1779 (Long Street South Cap and Long Street) structures shall have a 5” wide strip seal longitudinal expansion joint between their adjoining decks as shown in the plans.

12.2.7 Drainage System
Furnish a drainage design that will eliminate or reduce the need for scuppers by intercepting the flow prior to the bridge. The bridge deck surface drainage design shall conform to the following:

A. Design year storm frequency per Part 1, Section 2 of the City of Columbus Stormwater Drainage Manual, the L&D Manual requirements, and Section 11 of this document.

B. Allowable spread of zero (0) feet into traveled lane per Section 1103.2 of ODOT L&D Volume 2 for freeway and associated ramps. Allowable spread of six (6) feet into traveled lanes for City of Columbus streets.

Furnish a drainage system for the green spaces on the city street caps as shown on the plans in Appendix AE-02. See Section 11.4.1 for more information regarding the drainage system on the Long Street and Spring Street bridges.
The vertical profile shall be adjusted such that the low point of the sag vertical curve does not occur within the limits of the structure or approach slabs of the following structures FRA-670-0491 and FRA-71-1800B.

Scupper and Conduit Requirements for all structures:

A. Deck drainage shall be collected at the gutter lines (toe of parapet) by scuppers. Over-the-side drainage is not permitted. Provide erosion control at bridge ends according to Section 1113 of the ODOT L & D Manual, Volume 2.

B. Transverse deck drains are not permitted, except as shown on plans for FRA-71-1777 and FRA-71-1779 (Long Street South Cap and Long Street) and FRA-071-1790 (Spring Street) structures. See Section 11.4.1 for more information regarding the drainage system on the Long Street and Spring Street bridges and landscaped areas.

C. Welding of scuppers, downspouts, or drainage supports shall not be allowed in tension areas of main steel members.

D. If scuppers are required, a closed deck drainage system per section 209.3 of the ODOT Bridge Design Manual shall be used. Dropping drainage directly from the deck elevation to the ground elevation is not permitted.

E. Conduit enclosed in substructures is not permitted, except as shown on plans for FRA-071-1777 and FRA-71-1779 (Long Street South Cap and Long Street) and FRA-071-1790 (Spring Street) structures to allow routing of conduit from the bridge to the back side of the abutments.

F. Conduit enclosed in box type superstructure is not permitted.

G. Vertical conduit runs to the ground drainage system shall only be located at piers, except as noted in E above.

H. All bridge drainage systems shall be located within twenty (20) feet of a substructure unit, except as noted in E above.

I. Vertical conduit runs to the ground drainage system shall consist of closed conduit except for a free fall of two (2) feet above the ground. The drainage shall be controlled at the point of discharge (i.e. bottom of the vertical conduit) by permanent features that completely contain the discharge and prevent erosion to the adjacent ground while discharging up to the 25-year design storm.

J. The maximum permissible conduit bend angle is 45 degrees.

K. Clean outs shall be provided upstream of each bend, on vertical downspouts accessible from the ground, and at the end of each horizontal segment.

12.2.8 Clearance Requirements

Vertical clearance less than 16’-6” is not permitted on the Interstate system including ramps. Refer to the Bridge Design Manual and the L&D Manual for superstructure vertical clearance requirements for all other locations.
All clearances shall be field verified by the IQF and submitted to ODOT upon completion of Construction. Deficient clearances shall be corrected by the DBT at no cost to the ODOT.

12.2.9 Construction Plan Submittals
Construction plans shall be submitted in accordance with the provisions of Section 2.3 Quality Management Plan.

The technical proposal at a minimum shall meet the requirements listed for the Bridge Preliminary Design Report per Section 202.2 of ODOT’s Bridge Design Manual. The technical proposal shall include the following as a minimum:

A. Final Structure Site Plan.
B. Plan views, elevation views and cross sections of the foundations and substructures.
C. Superstructure transverse sections.
D. The approach roadway typical sections, including the face to face railing dimension and the toe to toe barrier dimension.

12.2.10 Approach Slabs
Approach slabs shall be used for all bridges on this project, except for FRA-071-1777 (Long Street South Cap) structure.

12.2.11 Barriers
Interstate and Interstate ramp bridge barriers shall be 42-inch high straight face deflector type per ODOT Standard Drawing SBR-1-99 except for city street bridge barriers. Refer to the Design Enhancement Manual for city street bridge barriers and to the plans for FRA-71-1777 and FRA-71-1779 (Long Street South Cap and Long Street) and FRA-071-1790 (Spring Street) structures.

Barriers and sidewalks shall not be considered part of the superstructure cross section for calculation of structural capacity.

12.2.12 Material Properties
Concrete shall conform to the Specifications for QC/QA Concrete as listed in Appendix ST-01.

The design concrete compressive strengths listed in the ODOT BDM shall be considered minimum values.

Lightweight concrete of any kind is not permitted for use in cast-in-place concrete decks or overlays.

12.2.13 Mass Concrete
Mass concrete is defined as any concrete element for which a minimum dimension measured in any direction is four- (4) feet or greater. The DBT shall provide the following for mass concrete elements to cope with the generation of heat of hydration and attendant volume change to minimize cracking:
A. Analysis of the anticipated thermal developments in the mass concrete for all expected project temperature ranges using the proposed mix design, casting procedures, and materials.

B. Description of the measures and procedures intended for use in maintaining a maximum temperature of less than 160°F and maintaining a temperature differential of 35°F or less between the interior and exterior portions of the designated mass concrete elements during curing. The 35°F temperature differential does not apply to drilled shaft foundations below grade.

Submit both the mass concrete mix design and the proposed plan to monitor and control the temperature differential concurrently to the IQF for acceptance prior to concrete placement.

Provide temperature-monitoring devices accepted by the IQF to record temperature development between the interior and exterior portions of the elements at points acceptable to the IQF.

The DBT shall read the monitoring devices and record the readings at not greater than 6-hour intervals, as accepted by the IQF, beginning when casting is complete and continue until the maximum temperature differential is reached and begins dropping. If monitoring indicates the 35°F temperature differential has been exceeded, take immediate action to retard further growth in the temperature differential and make the necessary revisions to the accepted plan to maintain the 35°F or less temperature differential on any remaining placements. Obtain the IQF’s acceptance of all revisions to the approved plan prior to implementation.

12.2.14 Sealing of Concrete Surfaces – Epoxy-urethane

For precast prestressed/pretensioned concrete I-beams or bulb-tees bridge structures, epoxy-urethane sealer shall be used for the concrete beams, the bottom and side surfaces of the deck superstructure concrete, the superstructure parapet and the required top deck surface (9”). The entire limits of sealing for the superstructure shall be per ODOT BDM Figure 302.1.4.3-1. The sealer for the underside and outside edge of the deck concrete, superstructure parapet and top of deck (9”) shall be Federal Color #17778. The concrete beam sealer color shall be per 12.2.4.

For steel beams or steel I-girders bridge structures, epoxy-urethane sealer shall be used for the bottom and side surfaces of the deck superstructure concrete, the superstructure parapet and the required top deck surface (9”). The entire limits of sealing for the superstructure shall be per ODOT BDM Figure 302.1.4.3-2, except that the limits of sealing for the underside of the deck overhang shall extend to the flange of the fascia beam or girder. The sealer shall be Federal Color #17778.

All exposed concrete surfaces of substructures shall be sealed with epoxy urethane sealer. See ODOT BDM Figures 303.1-1, 303.1-2, and 303.1-3 for sealing limits of substructures. The sealer shall be Federal Color #17778.

See appendix AE-02 for requirements on the Spring St, Long St, and Long Street Cap structures.

12.2.15 Bridge Load Ratings

All bridges shall be load rated per Section 900 of the ODOT BDM with the following clarifications and exceptions:
A. Rate all bridges using both the Load Factor Rating (LFR) method and the Load and Resistance Factor Rating (LRFR) method.

B. The bridge load rating shall be based on the final as-built configuration of the bridge.

C. The DBT shall provide a rating manual for any bridge type that is not compatible with BARS-PC or AASHTO Virtis software. The rating manual shall include a Microsoft Excel compatible spreadsheet in electronic format to load rate the bridge for future permit vehicles (i.e. overweight or super-load vehicles). Such vehicles may range up to 600,000 pounds, have as many as 25 axles, two to eight tires per axle to a width of 20 feet, and a length of 200 feet.

D. Each bridge load rating submission shall include the computer files in electronic format.

E. The bridge load rating report and rating manual shall be submitted to ODOT before the bridge is open to traffic.

12.2.16 Fencing

Fencing that complies with the Spring Street and Long Street Bridge Enhancement Plans (Appendix AE-02) is required on top of a single slope barrier atop the retaining walls south of Spring Street. See plans in Appendix AE-02 for FRA-71-1777 and FRA-71-1779 (Long Street South Cap and Long Street) and FRA-071-1790 (Spring Street) structures for decorative bridge fencing.

12.3 Criteria for Retaining Walls

Refer to Section 14 for retaining wall aesthetic design.

All exposed concrete surfaces of retaining walls shall be sealed with epoxy-urethane sealer. The sealer color shall be Federal Color #17778 (Light Neutral).

All permanent exposed retaining wall elements shall be within the ODOT L/A Right-of-Way. Unexposed substructure elements may extend outside of ODOT L/A Right-of-Way, but must be within the permanent Right-of-Way.

See section 12.2.16 for fencing requirements.

No permanent wood structural elements will be allowed.

12.3.1 MSE Retaining Walls

Lateral and vertical deflections of the MSE walls shall conform to the requirements of ODOT Supplemental Specifications SS840.

No utilities shall be placed within the reinforced soil mass of any MSE wall.

MSE retaining walls are not permitted south of Spring Street Bridge.
12.3.2 Cast-In-Place Concrete Cantilever Retaining Walls
All cast-in-place cantilever retaining walls shall be designed to limit the lateral deflection to 1% of the exposed wall height or 3 inches, whichever is less.

12.3.3 Other Retaining Wall Types
The lateral deflection shall be limited to 1% of the exposed wall height or 3 inches, whichever is less.

Reinforced concrete facing is required. The minimum thickness of concrete facing shall be ten (10) inches with two mats of steel reinforcements.

All pre-cast concrete panels attached to retaining walls, if used, shall be structurally connected with the main members supporting lateral loads. Refer to Appendix ST-01 for specifications on epoxy joining precast concrete segments.

Modular block walls are not permitted.

No tie-backs or foundations elements will be permitted outside of permanent Right-of-Way. See Appendix GE-08 for tie-back provisions.
March 2, 2011

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13 Noise Walls

This project does not include construction of any noise walls.
14 Aesthetics and Enhancements

14.1 Introduction

As part of the overall project development, the Department has received considerable input from local residents, community groups, project stakeholders, local officials and other groups regarding project aesthetic preferences to be incorporated into the final design of the project. The standards defined herein represent the minimum aesthetic requirements to be considered and addressed by the DBT during the design development of the project. The requirements of this specification apply to the design and construction of all permanent structures including but not limited to bridges, retaining walls, barriers, fencing, lighting, traffic signals, sidewalk paths, streetscape elements and landscape enhancements.

14.2 Governing Regulations

All work shall be performed in accordance with the requirements contained herein and the relevant requirements of the following standards and references.

14.3 Aesthetics and Enhancements Management Plan

The DBT shall develop an Aesthetics and Enhancements Management Plan defining the qualifications, responsibilities, and authority of the Aesthetics and Enhancements Manager; the responsibilities of the Aesthetics and Enhancements Management Graphic Support Team; and the methods for coordinating and interacting with ODOT.

14.3.1 Aesthetics and Enhancements Manager

The DBT shall assign an Aesthetics and Enhancements Manager to the Project.

See Selection Criteria for requirements.

The Aesthetics and Enhancements Manager shall have the responsibility to:

A. Develop and implement the Aesthetics and Enhancements Management Plan;
B. Coordinate aesthetics and enhancements issues with the Department, and the DBT’s design and construction teams; and

C. Oversee the preparation of 2D or 3D CAD drawings, renderings, or photo simulations as needed to depict conceptual and detailed solutions to address aesthetics and enhancements issues.
14.3.2 Methodology

14.3.2.1 Commitment to Context Sensitive Design and Solutions
The DBT’s work shall be consistent with Section 14 Standards and References and the following principles:

A. Use an interdisciplinary team tailored to project needs.
B. Apply flexibility inherent in design standards.
C. Incorporate aesthetics and enhancement considerations throughout project development

14.3.2.2 Producing an Aesthetics and Enhancements Management Plan
The DBT shall produce an Aesthetics and Enhancements Management Plan (AEM Plan) in accordance with the requirements of this Section.

The Aesthetics and Enhancements Management Plan shall:

A. Establish a plan for presenting final detailed aesthetics options to the public for feedback. At a minimum, the DBT shall conduct one public meeting to present options to the public on detailed aesthetic options that represent alternatives to the visual character and appearance of the constructed elements of the project. The public meeting shall be coordinated through the Department’s District 6 Public Information Officer. Elements of the design for which the DBT will present options shall include those in Table 14-1 a minimum.

Table 14-1: Aesthetic Options

<table>
<thead>
<tr>
<th>Project Section</th>
<th>Design Elements for Which DBT will Present Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridges</td>
<td>Color schemes, finished surface textures, pier shapes</td>
</tr>
<tr>
<td>Retaining Walls</td>
<td>Color schemes, finished surface textures</td>
</tr>
<tr>
<td>Fencing</td>
<td>Color schemes, design, materials, finishes</td>
</tr>
<tr>
<td>City Streets</td>
<td>Streetscape elements, street lighting, traffic signals, landscaping</td>
</tr>
</tbody>
</table>

This plan shall include the presentation of options to Columbus State Community College for retaining walls and fencing as agreed in the Contract for Right of-Entry (Appendix RW-02)

The plan shall establish the number of options to be shown for each element of the design, as well as the DBT’s methodology for collecting feedback from the public on these options for ODOT’s consideration. Options proposed and presented shall comply with the Spring Street and Long Street Landscape Enhancement Plans (Appendix AE-02). The I-70/I-71 Design Enhancement Manual is included in Appendix AE-01 and provide general information on common aesthetic
designs that are to be employed for this project and subsequent projects for the I-70/I-71 South Innerbelt.

B. Define the role of the Aesthetics and Enhancements Manager in identifying areas or elements of the proposed project bridges, roadways, and surroundings that present opportunities in the development of a visually acceptable design.

C. Define the responsibilities and authority the Aesthetics and Enhancements Manager will have in overseeing and reviewing the overall project design, design details, mock-ups, samples, and other submittals relating to the development of a visually acceptable design.

D. Define the authority of the Aesthetics and Enhancements Manager and the process for which the Aesthetics and Enhancements Manager will coordinate public input and Department approval with the DBT’s design and construction teams.

E. Establish a schedule for aforementioned public meeting, and for submittals of recommendations for Department approval. In an effort to ensure the DBT is preparing appropriate and approvable design aesthetic solutions, the Department will require frequent periodic aesthetic and enhancement design reviews in order to provide timely guidance and comments to the DBT.

F. Define the process of producing and submitting documentation of recommendations for aesthetics and enhancements, including review of the document by Department staff.

G. Aesthetic treatments and designs including but not limited to landscaping and streetscaping shall be incorporated into the final design. Aesthetic treatments shall complement adjacent historic properties. The Ohio State Historic Preservation Office and Section 106 consulting parties shall be provided an opportunity to review and comment on these designs. All comments shall be forwarded to the Department/FHWA for consideration.

H. The plan shall include the DBT’s process for developing options and addressing public feedback for the Long Street Bridge “Cultural Wall”, as required in Appendix AE-03. The Cultural Wall is referenced as Screen Wall Type A – North Side of Long in Appendix AE-02. All references to the finished imagery being provided by ODOT in Appendix AE-02 shall be replaced with the plan developed by the DBT, in accordance with Appendix AE-03.

14.3.2.3 ODOT Review of Aesthetics and Enhancement Management Plan

The Aesthetics and Enhancement Management Plan shall be submitted to the Department for review within 15 days of Contract Award. The Department will review the AEM Plan within 10 days of receipt from the DBT. The DBT shall not conduct the initial public meeting prior to the Department’s review of the AEM Plan and resolution of the Department’s comments on the proposed plan.

14.4 Design Requirements

14.4.1 Design Principles
As part of ODOT’s continuing public involvement effort, a Design Enhancement Stakeholder committee was formed consisting of key stakeholders and agency representatives. Input received from this committee and the public was used to develop the I-70/I-71 Design Enhancement Manual in Appendix AE-01, and the Spring Street and Long Street Bridge Landscape Enhancement Plans in Appendix AE-02.

It is necessary for the DBT to comply with the Design Enhancement Manual and develop designs and aesthetic details that address, to the greatest extent possible, the following principles:

A. Consideration of the people and environment along and adjacent to the project is important. Design should recognize the transit, bicycle and pedestrian uses along the existing and proposed City streets and consider improvements to accommodations of these modes of transportation.

B. The design should be sensitive to the scale and appearance of the neighborhoods abutting the project and should respect their special character.

14.4.2 General Aesthetic and Enhancement Requirements

The DBT shall design and build a Project that responds to the Project’s context and develops design solutions that address the Design Principles defined above, create visual harmony with the natural environment and abutting neighborhoods, visual order with the community setting, and design coherence within the highway corridor.

The DBT shall develop designs for and build all aesthetic and enhancement elements of the Project in conformance with the options approved by the Department, as described in the approved Aesthetics and Enhancement Management Plan. The design and construction shall comply with the Spring Street and Long Street Bridge Landscape Enhancement Plans (Appendix AE-02). The I-70/I-71 Design Enhancement Manual is included in Appendix AE-01 and provides general information on common aesthetic designs that are to be employed for this project and subsequent projects for the I-70/I-71 South Innerbelt.

References to the finished imagery being provided by ODOT for the Long Street Screen Wall Type A - North Side of Long in Appendix AE-02 shall be replaced with the DBT’s plan for the Cultural Wall, contained in the Aesthetics and Enhancements Management Plan, in accordance with Appendix AE-03.

The DBT shall coordinate the architectural character and surface treatments used on bridges and retaining structures so that a consistent surface treatment or family of complementary surface treatments is used throughout the Project corridor, as recommended in the I-70/I-71 Design Enhancement Manual (Appendix AE-01).

The DBT shall design and construct all aesthetic and enhancement elements so that the experience of travelers and neighbors is visually harmonious, orderly, and coherent in accordance with ODOT’s Design Policy—Design Excellence through Context Sensitive Design and Solutions.

Aesthetic and enhancement elements may consist of but not be limited to the following:
A. bridges (including but not limited to pier details, parapet details, texture, and color of fence, concrete sealers for parapet/superstructure/piers/abutments and painted steel surfaces)

B. streetscape enhancements (including trellis’s, planters, furnishings)

C. bicycle and pedestrian facilities

D. grading

E. retaining structures (texture, color, architectural details)

F. slope protection

G. vegetation

H. street lighting

I. traffic signal mast arms

J. fencing and screening

K. architectural concrete textures

L. architectural surface finishes

The DBT shall consider the Spring and Long Street Bridge Landscape Aesthetic Plans in Appendix AE-02 as the accepted, minimum design. The Department has spent much time and effort to reach consensus with the public on the landscape enhancement design as illustrated. Any substantive aesthetic design variance from these plans will require the DBT to go through a public process with local residents, community groups, project stakeholders, local officials and other groups to obtain acceptance of the revised design. The public process shall be detailed by the DBT in the Aesthetics and Enhancements Management Plan. The DBT shall plan for up to 3 public meetings with a minimum of 1 week “feedback” period between meetings. The meetings shall be held at a close convenient location to the stakeholders. Appropriate visual aids will be required. Prior Department approval is necessary before presenting any variances to the public. If these proposed variations are not found acceptable by ODOT, FHWA, or by the public Stakeholders, the DBT will be required to design and install the minimums found in the project requirements.

14.5 Construction Requirements

The DBT shall provide mock-ups and/or samples for the items determined or recommended by the I-70/I-71 Design Enhancement Manual in Appendix AE-01, the Spring Street and Long Street Bridge Landscape Plans in Appendix AE-02, and as described in the AEM Plan. Mock-ups and/or samples accepted by the Department shall become reference standard(s). The reference standard(s) shall be maintained undisturbed until Final Acceptance of the Project and shall address, at a minimum, the items listed in Table 14-1.

14.6 Deliverables

14.6.1 Aesthetics and Enhancements Management Plan
Within 15 Working Days of NTP, the DBT shall submit to the Department for approval an Aesthetics and Enhancements Management Plan as defined in Section 14.3.2.2.

The DBT shall develop and submit 10 individually bound, full-color, printed copies of the Aesthetics and Enhancements Management Plan to the Department for approval within 15 Working Days of NTP.

Within 15 Working Days of the Department’s Approval, the DBT shall submit to ODOT 40 full-color printed copies of the Approved Aesthetics and Enhancements Management Plan. The covers of these copies shall have the words “Approved Aesthetics and Enhancements Management Plan,” the name of the DBT, the name of the Project, and the date of the Department’s Approval printed on them. The Aesthetics and Enhancements Management Plan shall be bound in a 3-ring binder with waterproof cover. The contents shall be printed on 11-inch by 17-inch bond paper, landscape format.

In addition to the printed Approved Aesthetics and Enhancements Management Plan, the DBT shall provide the Department within 10 Working Days of ODOT Approval, five CD copies of the Aesthetics and Enhancements Management Plan in PDF format. Each CD shall be supplied in a plastic, re-sealable case and printed with the words “Approved Aesthetics and Enhancements Management Plan,” the name of the Project, and the date of the Department’s Approval. The printing shall be readable through the CD case.

**14.6.2 Record of Recommendations and Decisions**
The DBT shall compile and maintain a “Record of Recommendations and Decisions” as determined by the Department. This is a “living” document that will serve as guidance to the DBT throughout the design and construction of the project with regard to aesthetics and enhancements and context sensitive design issues. The document will include documentation of the public involvement and input received regarding aesthetics and enhancements. Copies of the updated “Record of Recommendations and Decisions” shall be submitted to the Department within two (2) working days after revisions or additions occur.

**14.6.3 Aesthetics and Enhancements Graphic Support**
The DBT shall provide sketches, 2D and 3D CAD drawings, renderings, photo simulations as necessary to adequately portray design and detail concepts or solutions to the ODOT and the public at large.

**14.6.4 Aesthetics and Enhancements Mock-ups and Samples**
The DBT shall provide mock-ups or samples for Approval by the Department as defined by Section 14.5, including mock-ups of retaining walls, parapets, samples of lighting elements, architectural materials/textures, and architectural finishes a minimum of 15 Days prior to the fabrication, construction or installation of any of these elements.
15 Traffic Control

The DBT shall design and construct traffic and pedestrian signals, signing, pavement markings, lighting and other traffic control in accordance with the requirements in this section.

15.1 General

The DBT shall furnish and install the traffic control devices, systems and measures as described within Section 15. Governing Regulations are listed in Section 1.14 and Supplemental Specifications are listed in Section 1.15. For cases where City of Columbus specifications conflict with ODOT standards for work on the City’s roadways, City of Columbus specifications shall govern. A list of roadways and their respective maintaining agencies is available in Section 1.7.

All supplied items shall be listed on ODOT’s QPL or Approved Lists, as applicable. Iron and steel must be of domestic origin. Fabricators must be on ODOT’s Certified Fabricators list.

Guarantees and warrantees for all materials and equipment are required per the Project Scope and specifications.

Refer to Section 6 Utilities for Traffic Control System requirements for the tunnel fire detection system.

15.2 Traffic Signals

Traffic signal work shall be addressed at seven (7) intersections within the project area. The DBT is responsible for development of the signal design plans for the project, which shall be submitted to the City of Columbus Division of Design and Construction for review as per Section 2.6.4.9. Traffic signal materials and equipment shall include the components described within this section as well as any other items necessary to provide and install fully functional traffic signals and signal systems. The design and construction shall consider interim and future conditions; of specific concern are signal structure foundation locations, signal head types and locations. Where new lanes are to be added in later phases, the holes in the mast arm and the associated mounting of the signal heads shall be appropriately aligned with the future lane configuration. Similarly, the signal structure foundations shall be placed so that future relocation will not be necessary, in addition to avoiding utility conflicts. The affected intersections are listed below. A general overview of the anticipated work required for each intersection is described in Section 15.2.1. All traffic signal materials and equipment shall be new. Requirements that apply to all intersections are provided in subsequent sections, including specific equipment requirements. The DBT is responsible for determining all components necessary to comply with the design standards. Refer to Section 6 for utility requirements. Traffic signal warrant analysis reports are provided in Appendices TC-01 and TC-02.

A. Cleveland Avenue at Jack Gibbs Boulevard (reconstruct signal)

   signal warrant previously approved

B. Cleveland Avenue at I-670 Eastbound Off Ramps (reconstruct signal)

   signal warrant previously approved

C. I-71 SB Off Ramp & Lester Drive at Spring Street (new signal)

   signal warrant previously approved
D. Elijah Pierce Avenue at Spring Street (new signal)  *signal warrant previously approved*
E. Lester Drive at Long Street (new signal)  *signal warrant previously approved*
F. Elijah Pierce Avenue at Long Street (new signal)  *signal warrant previously approved*
G. Cleveland Avenue at Jefferson Avenue (new signal)  *signal warrant previously approved*

### 15.2.1 General Description of Intersections

#### 15.2.1.1 Cleveland Avenue at Jack Gibbs Boulevard

Reconstruct signalized intersection.

Remove existing traffic signal and associated equipment.

Provide new mast arm signal. Provide crosswalks and pedestrian heads on the north, east and west legs of the intersection. Signalization of this intersection shall require four (4) single arm mast arm structures. The private driveway approach on the west leg of the intersection shall be signalized. The DBT is responsible for signal layout and design of the intersection in accordance with applicable design standards and ADA compliance.

Provide new 8 phase controller, ground mounted cabinet and cabinet hardware.

Provide coaxial interconnect according to the interconnect notes and details included in Appendices TC-09, TC-10, TC-11 and TC-12.

Signal phasing shall be as shown in Section 15.2.2.

Local intersection signal timing shall be determined by the DBT using City of Columbus standards and preferences. System signal timing will be implemented by the City through the central system and not be required by the DBT.

NO PEDESTRIAN CROSSING (R9-3a) signs shall be installed to prohibit crossing on the south leg of the intersection.

Power drop shall be underground and coordinated with AEP or DOPW(P), whichever is closest and/or easiest to access.

#### 15.2.1.2 Cleveland Avenue at I-670 Eastbound Off Ramps

Reconstruct signalized intersection.

Remove existing traffic signal and associated equipment.

Provide new mast arm signal. Provide crosswalks and pedestrian heads on the north, west, and east legs of the intersection. Signalization of this intersection shall require three (3) single arm mast arm structures. The DBT is responsible for signal layout and design of the intersection in accordance with applicable design standards and ADA compliance.

Provide new 8 phase controller, ground mounted cabinet and cabinet hardware.

Provide coaxial interconnect according to the interconnect notes and details included in Appendices TC-09, TC-10, TC-11 and TC-12.
Signal phasing shall be as shown in Section 15.2.2.

Local intersection signal timing shall be determined by the DBT using City of Columbus standards and preferences. System signal timing will be implemented by the City through the central system and not be required by the DBT.

NO PEDESTRIAN CROSSING (R9-3a) signs shall be installed to prohibit crossing on the south leg of the intersection.

Power drop shall be underground and coordinated with AEP or DOPW(P), whichever is closest and/or easiest to access.

15.2.1.3  I-71 SB Off Ramp & Lester Drive at Spring Street
Install new signal at intersection.

Provide new mast arm signal. Provide crosswalks and pedestrian heads on the north, south, west and east legs of the intersection. Signalization of this intersection shall require two (2) single arm mast arm structures. The DBT is responsible for signal layout and design of the intersection in accordance with applicable design standards and ADA compliance.

Provide new 8 phase controller, ground mounted cabinet and cabinet hardware.

Provide coaxial interconnect according to the interconnect notes and details included in Appendices TC-09, TC-10, TC-11 and TC-12.

Signal phasing shall be as shown in Section 15.2.2.

Local intersection signal timing shall be determined by the DBT using City of Columbus standards and preferences. System signal timing will be implemented by the City through the central system and not be required by the DBT.

NO TURN ON RED/EXCEPT CURB LANE (R10-H11e) signs shall be installed for the southbound (right turn) approach.

Power drop shall be underground and coordinated with AEP or DOPW(P), whichever is closest and/or easiest to access.

15.2.1.4  Elijah Pierce Avenue at Spring Street
Install new signal at intersection.

Provide new mast arm signal. Provide crosswalks and pedestrian heads on the north, south, east and west legs of the intersection. Signalization of this intersection shall require two (2) single arm mast arm structures. The DBT is responsible for signal layout and design of the intersection in accordance with applicable design standards and ADA compliance.

Provide new 8 phase controller, ground mounted cabinet and cabinet hardware.

Provide coaxial interconnect according to the interconnect notes and details included in Appendices TC-09, TC-10, TC-11 and TC-12.
Signal phasing shall be as shown in Section 15.2.2.

Local intersection signal timing shall be determined by the DBT using City of Columbus standards and preferences. System signal timing will be implemented by the City through the central system and not be required by the DBT.

Power drop shall be underground and coordinated with AEP or DOPW(P), whichever is closest and/or easiest to access.

15.2.1.5  **Lester Drive at Long Street**

Install new signal at intersection.

Provide new mast arm signal. All aspects of the traffic signal installation, including conduits, pull boxes, cable, and controller features, shall be installed except the mast arm and pedestal(s) on the SW corner of the intersection. These will be installed in a future phase when the final SW corner is constructed. Provide crosswalks and pedestrian heads on the north and east legs of the intersection. Interim pedestals shall be installed where necessary on the SW corner to accommodate the current situation. Signalization of this intersection shall require one (1) single arm mast arm structure. Interim SB vehicular signal heads shall be installed on a span that is supported by the mast arm support on the SE corner and the embedded steel signal pole on the SW corner. The DBT is responsible for signal layout and design of the intersection in accordance with applicable design standards and ADA compliance.

Provide new 8 phase controller, ground mounted cabinet and cabinet hardware.

Provide coaxial interconnect according to the interconnect notes and details included in Appendices TC-09, TC-10, TC-11 and TC-12.

Signal phasing shall be as shown in Section 15.2.2.

Local intersection signal timing shall be determined by the DBT using City of Columbus standards and preferences. System signal timing will be implemented by the City through the central system and not be required by the DBT.

Power drop shall be underground and coordinated with AEP or DOPW(P), whichever is closest and/or easiest to access.

15.2.1.6  **Elijah Pierce Avenue at Long Street**

Install new signal at intersection.

Provide new mast arm signal. All aspects of the traffic signal installation, including conduits, pull boxes, cable, and controller features, shall be installed except the mast arm and pedestal(s) on the SE corner of the intersection and except as described later in this section. These will be installed in a future phase when the final SE corner is constructed. Provide crosswalks and pedestrian heads on the north, east and west legs of the intersection. If a ramp for the south crosswalk is constructed on the SW corner, a permanent pedestrian signal on either a pedestal or mast arm shall also be installed. Otherwise, provisions, including conduit and/or pull boxes, shall be made on the SW corner for a pedestrian crossing on the south leg of the intersection. Signalization of this intersection shall require two (2) single arm mast
arm structures for the current operation. The DBT is responsible for signal layout and design of the intersection in accordance with applicable design standards and ADA compliance.

Provide new 8 phase controller, ground mounted cabinet and cabinet hardware.

Provide coaxial interconnect according to the interconnect notes and details included in Appendices TC-09, TC-10, TC-11 and TC-12.

Signal phasing shall be as shown in Section 15.2.2.

Local intersection signal timing shall be determined by the DBT using City of Columbus standards and preferences. System signal timing will be implemented by the City through the central system and not be required by the DBT.

NO TURN ON RED (R10-11) signs shall be installed for the northbound (right turn), westbound (right turn) and eastbound (left turn) approaches.

Mainline stop lines are not required. The omission of other pavement markings shall be at the discretion of the Department. The 630 ITEM, SIGNS AS PER PLAN, requirements shall be waived and not required. Signs that are related to the operation of a signal are not to be installed. Signs required for the operation of a non-signalized intersection are to be installed. A STOP sign (R1-1) sign shall be installed for the WB right turn movement.

All electrical circuits shall be simultaneously energized to test for signal conflicts, wiring shorts or opens and loose, open or crossed connections. The “flash” period and ten-day test shall be waived but the installation shall be thoroughly tested. The signal shall be turned on and all electrical devices tested for proper operation. This test is anticipated to last approximately 30 minutes. All malfunctions shall be corrected. Department personnel shall approve any and all electrical power source(s) used for on-site testing of any electrical device.

Pushbuttons are not required to be installed but the pushbutton circuit is to be tested by simulating a pushbutton call by touching the cable ends together and then verifying that the controller registers and services the call. Pushbutton signs are not to be installed.

Video image sensors and its cabling are to be thoroughly tested but the unit does not need to be mounted on its supporting bracket for testing purposes.

Vehicular heads are to be tested by fully energizing the indications through their load switch and their cabling. Pedestrian heads are to be tested by fully energizing each display through their load switch and their cabling.

The power cable shall be properly terminated and secured in the replacement cabinet. At the direction of the Department, the contractor shall have the service/power cable disconnected at the power source or at the power-service cable splice point. Disconnected cable at a power source shall be tagged as “traffic signal power cable.”

The contractor can submit an alternate method of testing for evaluation and acceptance, which must be reviewed by the City of Columbus Division of Design and Construction and approved by the Department.
This method must cover the total testing of all electrical devices and their cabling. After all installed traffic signal items have been completely tested and accepted, the City of Columbus Division of Planning and Operations shall remove the signal controller equipment and all vehicular and pedestrian signal heads.

Power drop shall be underground and coordinated with AEP or DOPW(P), whichever is closest and/or easiest to access.

15.2.1.7  Cleveland Avenue at Jefferson Avenue
Install new signal at intersection.

Provide new mast arm signal. Provide crosswalks and pedestrian heads on the east and south legs of the intersection. Signalization of this intersection shall require three (3) single arm mast arm structures for the current operation. The DBT is responsible for signal layout and design of the intersection in accordance with applicable design standards and ADA compliance.

Provide new 8 phase controller, ground mounted cabinet and cabinet hardware.

Provide coaxial interconnect according to the interconnect notes and details included in Appendices TC-09, TC-10, TC-11 and TC-12.

Signal phasing shall be as shown in Section 15.2.2.

Local intersection signal timing shall be determined by the DBT using City of Columbus standards and preferences. System signal timing will be implemented by the City through the central system and not be required by the DBT.

Power drop shall be underground and coordinated with AEP or DOPW(P), whichever is closest and/or easiest to access.

15.2.2  Traffic Signal Phasing
Traffic signal phasing shall be implemented at each intersection as indicated below:

15.2.2.1  Cleveland Avenue at Jack Gibbs Boulevard
Three-phase operation

<table>
<thead>
<tr>
<th>Phase #</th>
<th>Vehicular movements</th>
<th>Pedestrian movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 + 2</td>
<td>SB Left turn (+ SB thru)</td>
<td>West leg</td>
</tr>
<tr>
<td>2 + 6</td>
<td>NB + SB phase (SBLTs permitted)</td>
<td>East leg, West leg</td>
</tr>
<tr>
<td>4 + 8</td>
<td>EB +WB phase</td>
<td>North leg</td>
</tr>
</tbody>
</table>

15.2.2.2  Cleveland Avenue at I-670 Eastbound Off Ramps
Three-phase operation

<table>
<thead>
<tr>
<th>Phase #</th>
<th>Vehicular movements</th>
<th>Pedestrian movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 + 2</td>
<td>SB Left turn (+ SB thru)</td>
<td>West leg</td>
</tr>
<tr>
<td>2 + 6</td>
<td>NB + SB phase (SBLTs permitted)</td>
<td>East leg, West leg</td>
</tr>
<tr>
<td>8</td>
<td>EB phase</td>
<td>NONE</td>
</tr>
</tbody>
</table>
15.2.2.3  I-71 SB Off Ramp & Lester Drive at Spring Street
Two-phase operation

<table>
<thead>
<tr>
<th>Phase #</th>
<th>Vehicular movements</th>
<th>Pedestrian movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>All WB (left turn, thru)</td>
<td>North leg, South leg</td>
</tr>
<tr>
<td>4</td>
<td>All SB (thru, right turn)</td>
<td>East leg</td>
</tr>
</tbody>
</table>

15.2.2.4  Elijah Pierce Avenue at Spring Street
Two-phase operation

<table>
<thead>
<tr>
<th>Phase #</th>
<th>Vehicular movements</th>
<th>Pedestrian movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>All WB (thru, right turn)</td>
<td>North leg, South leg</td>
</tr>
<tr>
<td>8</td>
<td>All NB (left, thru, right turn)</td>
<td>East leg, West Leg</td>
</tr>
</tbody>
</table>

15.2.2.5  Lester Drive at Long Street
Two-phase operation

<table>
<thead>
<tr>
<th>Phase #</th>
<th>Vehicular movements</th>
<th>Pedestrian movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>All EB (thru, right turn*)</td>
<td>North leg, South leg*</td>
</tr>
<tr>
<td>4</td>
<td>All SB (left turn, thru*)</td>
<td>West leg, East leg</td>
</tr>
</tbody>
</table>

*indicates signal movement that will not exist until future project phases are built (south of Long Street).

15.2.2.6  Elijah Pierce Avenue at Long Street
Four-phase operation

<table>
<thead>
<tr>
<th>Phase #</th>
<th>Vehicular movements</th>
<th>Pedestrian movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>All EB (left turn, thru)</td>
<td>South leg*</td>
</tr>
<tr>
<td>2</td>
<td>All WB (right turn only)</td>
<td>NONE</td>
</tr>
<tr>
<td>8</td>
<td>All NB (left turn*, thru*, right turn*)</td>
<td>West leg, East leg</td>
</tr>
<tr>
<td>2P</td>
<td>NONE</td>
<td>North leg</td>
</tr>
</tbody>
</table>

*indicates signal movement that will not exist until future project phases are built (south of Long Street).

15.2.2.7  Cleveland Avenue at Jefferson Avenue
Three-phase operation

<table>
<thead>
<tr>
<th>Phase #</th>
<th>Vehicular movements</th>
<th>Pedestrian movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 + 2</td>
<td>SB Left turn (+ SB thru)</td>
<td>NONE</td>
</tr>
<tr>
<td>2 + 6</td>
<td>NB + SB phase</td>
<td>East leg</td>
</tr>
<tr>
<td>8</td>
<td>WB phase (+ SB left turn)</td>
<td>South leg</td>
</tr>
</tbody>
</table>

Controller overlaps shall be established for the SBLT (phase 5) and the WBRT (phase 8).

The proposed phasing shall not allow the SBLT (phase 5) movement to follow the NB thru (phase 6) movement in order to avoid a Yellow Ball Trap.

15.2.3  Points of Contact for Traffic Signals
Points of contact for coordination of traffic signal power sources are:
15.2.4  Signal Supports

Signal supports shall be galvanized steel mast arm design. Wood poles are not permitted. A structure that diagonally spans the intersection and carries signal heads for multiple approaches is not permitted. Refer to Section 14.4 for additional design information.

Signal supports and color coating finish shall comply with City of Columbus standard specifications included in Appendices TC-03, TC-04 and TC-05. Signal supports, pedestals and bracket arms shall be finished in a black color, Federal Color Number 27038.

Location of the mast arm signal supports shall be as per the Traffic Engineering Manual and shall conform to ADA requirements for clearance and placement.

Mast arm pole shall be installed in a location that will accommodate a pushbutton (proposed or future), as per City of Columbus Pedestrian Pushbutton Location General Policies (see Appendix TC-08). If this cannot be accomplished with a mast arm pole, a pedestal shall be installed.

The center of the mast arm support pole shall be a minimum of 4.0 feet from the face of curb.

Minimum clearance from overhead electric wires shall comply with requirements of the National Electric Safety Code, Rule 232, and the requirements of the local power companies providing electrical service.

If a given approach does not have a left-turn lane, the associated mast arm arm length shall be 2 feet beyond the signal head or sign located farthest from the mast arm pole.

If a given approach has a left-turn lane, the associated mast arm arm length shall be 3.5 feet beyond the centerline of that left-turn lane.

Signal support arms shall be ordered to proper length; arms shall not be cut off to comply with arm length requirements.

Mast arm signal supports may include luminaire extensions based on Section 15.6.7. Combination street lighting luminaires (120 volt) shall obtain power from the traffic signal controller cabinet. City of Columbus 480 volt street lighting shall have separate power sources from the signalized intersections. Refer to Section 15.6 Lighting for more information.

Signal supports shall comply with CMS Items 632.15 and 732.11 as well as the City of Columbus specifications and details included in Appendices TC-03, TC-04 and TC-05.
Signal supports shall be grounded in accordance with CMS Item 625.16.

A vehicular signal head mounted on a pedestal support shall only be permitted if it provides the best placement when a near supplemental signal head is required. As noted above, pedestrian heads can be mounted on pedestal supports. Pedestals shall comply with the specifications included in Appendices TC-03 and TC-05.

15.2.5 **Vehicular Signal Heads with LED Lamp Units**
Vehicular signal heads shall comply with CMS Items 632 and 732, City of Columbus standards, SCDs and the TEM. All vehicular signal heads shall consist of 12-inch LED modules.

15.2.6 **Pedestrian Heads, Features and Accommodations**
Pedestrian accommodations shall be provided on the approaches of the signalized intersections in the project area, as identified in Section 15.2.1, to include sidewalks, curb ramps, cross walks, pedestrian pushbuttons, accessible pedestrian signals, and pedestrian signal heads. Pedestal mounted pedestrian signal heads shall be used, as identified in Section 15.2.1, as necessary. The preference is to pair a pushbutton and the corresponding pedestrian signal together on the same support, unless another support offers significantly better alignment for the pedestrian signal.

All pedestrian accommodations shall be ADA compliant.

Pedestrian pushbuttons (PPBs) shall be provided for all pedestrian phases associated with the traffic phase. Pedestrian pushbuttons shall be provided as follows:

A. Cleveland Avenue at Jack Gibbs Boulevard (PPB’s for north, east and west legs)
B. Cleveland Avenue at I-670 Eastbound Off Ramps (PPB’s for north, west, and east legs)
C. I-71 SB Ramp & Lester Drive at Spring Street (PPB’s for north, south, west and east legs)
D. Elijah Pierce Avenue at Spring Street (PPB’s for north, south, east and west legs)
E. Lester Drive at Long Street (PPB’s for north, south, east and west legs)
F. Elijah Pierce Avenue at Long Street (PPB’s for north, east and west legs)
G. Cleveland Avenue at Jefferson (PPB’s for east and south legs)

Pedestrian pushbuttons shall be located according to the City of Columbus General Policy and Procedure for Pedestrian Pushbutton Location (dated October 1, 2005). This policy has been included in Appendix TC-08. If a signal support cannot be placed in a location that will satisfy the requirements for pedestrian pushbutton placement, a pedestal shall be installed.

Pedestrian pushbuttons shall comply with CMS Items 632 and 732, and as indicated in Appendices TC-03 and TC-05.

Signing for pedestrian pushbuttons shall be City of Columbus CM-R73 signs, two for each pushbutton, with Type G sheeting and all mounting hardware.

15.2.7 **Pedestrian Treatments**
ADA-compliant pedestrian ramps and associated treatments shall be provided per Section 10.5.2.

Crosswalks at signalized intersections shall be provided in accordance with Section 15.5.2.3.
15.2.8 Traffic Control Equipment
The DBT shall furnish and install an actuated, 8-phase, solid state digital microprocessor type controller with all accessories that are necessary to make the controller completely functional and operational at each of the signalized intersections with a reconstructed or new signal. The controllers shall be Econolite or Eagle TS2-Type 2 controllers. The controllers shall be installed in TS2-Type 1 cabinets (ground-mounted). The controllers shall be shelf-mounted. The controllers shall conform to CMS Items 633 and 733 as well as the City of Columbus specifications and details included in Appendix TC-03. The controller cabinet assembly shall be completely wired, including all panels and harnesses, for operation on the central coaxial cable interconnect system.

Controller cabinet placement requirements:

A. Adhere to ADA space requirements.
B. Locate cabinet as far back from the curb as possible for technician access, while still being within the right-of-way.
C. If base-mounted controller cabinet is located in sidewalk, align cabinet parallel to one of the streets.
D. The near edge of the controller cabinet foundation shall be a minimum of 3.5 feet from face of curb.
E. The controller cabinet door shall open away from street – any exception must be reviewed by the City and approved by the Department. The most common exception would be where the controller cabinet is placed behind or at the back edge of the sidewalk and there is insufficient right-of-way to accommodate a work pad.
F. Allow for maximum visibility of signal heads.
G. Allow for logical cable routing.
H. The area in front of the cabinet door shall provide sufficient work space for technicians to access the equipment and remain within right-of-way.
I. Provide sidewalk and/or work pads for cabinet access. Work pad/access area shall be at least 4 feet x 3 feet.

Signal controller cabinets shall be grounded according to the foundation details included in Appendices TC-03 and TC-05.

All traffic signal installations shall be designed and equipped for approach monitoring. If a two phase signal is used, a dual ring controller and cabinet wiring utilizing phases 2+6 and 4+8 shall be furnished and installed.

15.2.9 Traffic Flow Monitors
The DBT shall install Traffic Flow Monitors according to the City of Columbus details and specifications included in Appendices TC-03 and TC-05.

Traffic flow monitors shall be installed at the following signalized locations:

   I-71 SB Off Ramp & Lester Drive at Spring Street (Camera No. 19, Channel 21) – on a bracket arm on the East mast arm pole (alternate location on a bracket arm on the South mast arm pole.
March 2, 2011

Long Street at Elijah Pierce Avenue (Camera No. 7, Channel 22) – on a camera pole located on the NW corner of the intersection (alternate locations are on a camera pole located on the NE corner of the intersection and on a bracket arm on the North mast arm pole);

The City of Columbus Division of Design and Construction must review and the Department must approve the consideration of alternate traffic flow monitor locations.

Bracket arms for traffic flow monitors shall be installed on a mast arm pole and shall be installed in the same orientation as (parallel to) the mast arm arm.

Traffic flow monitor cabinet shall be ground-mounted and shall be installed within 40 ft. of the mast arm pole or camera pole upon which the traffic flow monitor is mounted. Traffic flow monitor cabinets shall be grounded according to the foundation details included in Appendix TC-05.

Power service to Traffic flow monitor cabinets shall be isolated/separated from traffic signals. A common power source is acceptable.

15.2.10 Foundations

Provide foundations for all mast arm, pedestal and camera pole structures. Foundations shall comply with CMS Items 625, 632 and 633, SCDs, the TEM, and details included in Appendices TC-03 and TC-05. In accordance with the details included in Appendices TC-03 and TC-05, a new cabinet foundation shall be constructed at each signalized intersection with a reconstructed or new signal.

15.2.11 Signal Interconnect

15.2.11.1 City of Columbus Coaxial Interconnect

Coaxial interconnect shall be provided according to the details and specifications provided in Appendices TC-09, TC-10, TC-11 and TC-12. As defined in the specifications, the existing coaxial interconnect cable shall be maintained and remain operational, retaining control (on-line status) of any existing signal interconnect to any signal(s), until it is disconnected and the new coaxial interconnect cable has been connected into the coaxial cable system. If necessary, temporarily rerouting the coaxial interconnect cable is an acceptable means of keeping the existing interconnect cable plant operational, as long as the appropriate signal levels and overall functionality of the interconnect cable plant are maintained. Splices, upon approval from the Department, are permissible for only the temporary cable plant.

The coaxial interconnect cable plant shall be designed to minimize the length of coaxial cable between devices. The coaxial interconnect cable design shall be reviewed by the City of Columbus Division of Design and Construction and approved by the Department prior to beginning construction of the coaxial cable infrastructure.

For aerial installation, interconnect messenger wire shall be 7-strand, 1/4-inch diameter, extra-high strength.

If geometric changes on Cleveland Ave. necessitate the relocation of the amplifier cabinet located on the SW corner of Cleveland Ave. at I-670 EB off ramp, a base-mounted amplifier cabinet shall be installed. Additionally, since the existing coaxial interconnect cables will not be long enough to reach the relocated amplifier cabinet, the existing cable from the amplifier cabinet to the 14-dB tap in the SW pull box at
Cleveland Ave. at Mt. Vernon Avenue and the existing cable from the amplifier cabinet to the 16-dB directional coupler at the top of the wood utility pole on the NE corner of Cleveland Ave. at Jack Gibbs Blvd. shall be removed; and new coaxial interconnect cables shall be installed to replace them.

15.2.11.2 City of Columbus Traffic Signal System (CTSS) – Phase A

Background/Description of Work
The City of Columbus has a project with limits that overlaps this Design-Build project. Major components of the project in the overlapping limits are installing two (2) 288-strand and one (1) 12-strand single mode fiber cables, splice enclosures and splicing straight through to the Columbus infrastructure. The project is on file at ODOT District 6 under PID No. 82540, Columbus Traffic Signal System Phase A, and at Columbus under 2643 Dr. E.

The DBT shall be responsible for the following items as shown on the ODOT PID 82540 plans included in Appendix TC-14:

- One continuous 288 strand fiber in existing and proposed conduits (by the DBT) from
  - Approximately STA 205+00 to STA 213+00 – Sheet 94
  - STA 213+00 to STA 238+38 – Sheet 95
  - STA 238+38 to STA 958+00 – Sheet 36
  - STA 958+00 to approximately STA 976+50, 70’ RT – Sheet 37
- A second continuous 288 strand fiber in existing and proposed conduits (by the DBT) from
  - Approximately STA 905+26, 71’ LT to STA 958+00 – Sheet 36
  - STA 958+00 to approximately STA 976+50, 70’ RT – Sheet 37
- One continuous 12 strand fiber in existing and proposed conduits (by the DBT) from
  - STA 976+50, 70’ R to the new ODOT communication cabinet installed as part of the Design-Build project

The DBT shall be responsible for installing any splice kits, pullboxes, and other miscellaneous items to achieve connectivity to the Columbus infrastructure. The DBT shall review the City’s plans (ODOT PID No. 82540), in particular plan sheets 36, 37, 94, 95, and any other applicable plan sheets.

The DBT shall coil 150’ of the 288-fiber optic cable at the following (3) three approximate locations in existing 48” pullboxes and shall splice all 288 fibers into existing fiber into the Columbus project and shall provide splice enclosures as specified in the appendices. The following locations are approximate pullbox and splice locations in the ODOT PID No. 82540 plans and result because of this DB project:

- ODOT PID No. 82540
  - Sheet 36, STA 905+26, 71’ L
  - Sheet 37, STA 976+50, 70’ R
  - Sheet 94, STA 205+32, 68’ R

As-built plans of new pullboxes and conduit installed and splice locations shall be provided to the Department by the DBT when the work is completed.

The DBT shall have no fewer than three meetings with City of Columbus and Department personnel to discuss installation of infrastructure, coordination, work, and sequence of operations. The DBT shall
prepare an agenda for each meeting and submit for comments to all contacts in Section 15.4.12 CONTACTS at least five (5) days in advance of the meeting. Meeting minutes shall be taken and distributed by the DBT for record purposes. The meetings shall be coordinated by the DBT and shall take place during the following stages of the project:

- Prior to the commencement of the CTSS and ITS design
- No more than thirty (30) days prior to the beginning of the construction period
- During the Construction period at the DBT’s and/or City of Columbus and the Department’s discretion

**General**

These notes detail the materials and construction techniques required for construction of communications infrastructure for the City of Columbus, Department of Public Service, Columbus Traffic Signal System (CTSS).

Wherever the designation "Engineer" appears it refers to the Department’s (Construction) Project Engineer. The term "Owner" or “City” refers to the City of Columbus. The designation "DBT" refers to the Design-Build Team for this project.

The applicable sections of the City of Columbus Construction and Materials Specifications, including all construction supplements thereto, shall govern all construction items that are not specifically covered in these notes.

The construction of this project also includes the following tasks:

- Conducting all required fiber optic OTDR tests and submitting test results to the City as identified in Appendix TC-13.
- Providing all incidental equipment and performing all necessary tasks to provide a smooth and continuous integration of all the field and central equipment as one system
- Providing bonded warranties for workmanship, equipment, and maintenance for all furnished equipment after final system acceptance as long as the ODOT ITS equipment.
- Providing all necessary documentation

**15.2.11.2.1 Communications General Requirements**

The DBT shall be fully responsible for complete installation and testing of the fiber optic cable and ancillary components for the stations identified in these notes and appendices. The communications infrastructure and ancillary components include, but are not limited to, the furnishing and installation of pullboxes, conduit, and fiber optic cable to accommodate the Columbus Traffic Signal System.

**15.2.11.2.2 Applications Standards**

All materials and installation procedures shall conform to these notes, specifications and appendices, as well as the Governing Regulations listed in Section 1.14. All electrical work shall conform to the standards of the National Electrical Manufacturers Association (NEMA), the Underwriters' Laboratories Inc. (UL), the Electrical Testing Laboratories (ETL), the National Electrical Testing Association (NETA), or the Electronic Industries Association (EIA)/Telecommunications Industries Association (TIA)
wherever applicable. In addition to the requirements of the approved shop drawings, to be prepared by the DBT, and these Supplemental Specifications, all materials and workmanship shall conform to the requirements of the National Electrical Code (NEC) and the National Electric Safety Code (NESC). All communication work shall conform to the standards of the Federal Communication Commission (FCC) and Institute of Electrical and Electronics Engineers (IEEE).

15.2.11.2.3 Complete Operational Systems
The DBT shall furnish and install a continuous and operational fiber system with end-to-end connectivity between the CTSS Phase A project points and all spliced connection points in the area shown on the ODOT PID 82540 plans.

15.2.11.2.4 New Equipment
All components, parts, interconnecting cable and other items used in the manufacture and installation of equipment under these notes shall be new and unused. All parts and components shall be the latest proven model in current production.

15.2.11.2.5 Electrical Materials
Electrical materials and fittings shall conform to the requirements of the National Electrical Code. Electrical fittings shall be watertight and weatherproof. Dissimilar metals shall be separated by an inert dielectric material.

15.2.11.2.6 Verification of Site Conditions
It shall be the DBT's responsibility to check the environmental, electrical, and physical conditions at the equipment installation sites to ensure that the system equipment furnished and installed will operate as specified.

15.2.11.2.7 Wiring and Connections
The DBT shall furnish and install all wiring, conduit and connections required for complete operation of the system. All wiring shall be measured and installed to fit each location. Excessive slack shall not be allowed. Pre-made cables from the manufacturer are the preferred product and any field-made cables shall be retested. All wiring, conduit, and connections shall conform to accepted industry standards.

15.2.11.2.8 Submittals
The DBT shall provide all submittals as required elsewhere in these notes.

The DBT shall submit two complete original sets (photocopies of printed material are not acceptable) of the following to the City:

- Manufacturer's detailed product data "cut-sheets" and specifications for each piece of equipment, conduit, and cable to be furnished.
- Detailed testing procedures and certified copies of all test results and reports.
- All drawings as detailed herein.
- Manufacturer's installation, operation, and maintenance manuals.
- The exception is the fiber optic OTDR submittals. See the Fiber Optic Cable item in Appendix TC-13 for details.
15.2.11.2.9 Utility Notification
The DBT shall conform to the NEC and the Ohio MUTCD in the performance of Contract work. The DBT shall observe the regulations of utilities in the area of their equipment, and exercise due caution in construction work near their facilities.

At least three working days prior to commencing construction operations in an area which may involve underground utility facilities, the DBT shall notify the Engineer, the Ohio Utilities Protection Service (OUPS) and the owners of each underground facility in the vicinity of the work areas. The DBT shall be responsible for any damage to existing facilities in the vicinity of the work areas and/or marked in the field, and shall bear the cost of repair or replacement and other costs incurred by outage resulting from such damage. The owners of the underground utility facility require that notice be provided of at least forty-eight (48) hours, excluding Saturdays, Sundays and Legal Holidays, to stake, mark or otherwise designate the location of the underground utility facilities in the construction area in such a manner as to indicate their course together with the approximate depth at which they were installed. The marking or locating shall be coordinated to stay a minimum of two days ahead of the planned construction.

15.2.11.2.10 Protect City/ODOT Infrastructure
Protection of the existing City of Columbus Traffic and ODOT infrastructure during construction activities is critically important for the safety of construction workers and the general public. The City of Columbus DPS & DOT and the Columbus Metropolitan Freeway Management System (CMFMS) infrastructure are not protected by calling the OUPS. A separate request must be made to the City of Columbus DPS & DOT and the ODOT D6 ITS ENGINEER at least three (3) business days in advance of any digging.

Any damage to this critical infrastructure shall be repaired immediately by the DBT, at the sole discretion of the Engineer. All costs of the emergency repairs for the damage shall be paid by the DBT regardless of who does the repair.

15.2.12 Power Service
Electric power shall be obtained from AEP or DOPW(P), whichever is closest and/or easiest to access, and as indicated below.

Power supply shall be 120V.

The DBT shall be responsible for requesting and scheduling any inspections the power company may require for the power service hook up. The DBT shall be responsible for contacting the power company for the electrical service connection. Under no circumstances shall the DBT splice power cable into the power company’s circuits. The DBT is responsible for obtaining any necessary permits and the paying of all fees. The DBT shall pay all power charges until the signals are accepted by the City of Columbus.

Location and use of the power sources shall be coordinated and confirmed with AEP or DOPW(P), as appropriate for the following signalized intersections.

A. Cleveland Avenue at Jack Gibbs Boulevard
B. Cleveland Avenue at I-670 Eastbound Off Ramps
C. I-71 SB Ramp & Lester Drive at Spring Street
D. Elijah Pierce Avenue at Spring Street  
E. Lester Drive at Long Street  
F. Elijah Pierce Avenue at Long Street  
G. Cleveland Avenue at Jefferson

Power service shall comply with CMS Item 625.15.

All signalized locations shall have unmetered, underground power feeds.

The DBT shall apply for all inspections, pay the appropriate fees, and advise the Department of the time of inspections so that they may have a representative in attendance.

15.2.13 Vehicle Detection

Video detection shall be used for vehicle detection on all approaches. Video detection cameras shall be mounted on bracket arms. Bracket arms for video detection cameras shall be installed on a mast arm pole and shall be installed in the same orientation as (parallel to) the mast arm arm. Alternate means of detection shall not be permitted. City of Columbus video detection specifications and details have been included in Appendices TC-03 and TC-05.

15.2.14 Emergency Vehicle Preemption

Emergency vehicle preemption shall not be provided.

15.2.15 Pull Boxes

Pull boxes shall comply with the City of Columbus Pull Box Specification, provided in Appendices TC-03 and TC-05, CMS Item 625.11, SCDs and the TEM.

Pull boxes shall be appropriately sized for the number of conduit entrances.

A 32-inch diameter concrete pull box shall be located within 25 feet of the controller cabinet and shall be the access point for interconnect and signal cable conduits entering the controller cabinet.

Pull boxes shall neither be located in curb ramp nor curb ramp landing areas. Non-interconnect pull boxes shall not be located in areas subject to vehicular traffic. The first preference for the location of an interconnect pull box is in the sidewalk or other area behind the curb not subject to vehicular traffic. If an interconnect pull box must be located in the street, every effort shall be made to locate it so that the pull box frame and lid is completely contained within a single lane and is not in the normal track of vehicular tires. Also, consideration shall be given to the location that will have the least impact on the travelling public when City maintenance personnel need to access it in the future.

32-inch diameter concrete pull boxes shall be used for interconnect pull boxes unless otherwise specified. A 48-inch diameter concrete pull box shall be used for a interconnect pull box if a fiber optic splice case and/or a large coil of fiber optic cable shall be contained in the pull box.

Pull box lids shall have the word “TRAFFIC” embossed into the lid.

Existing pull boxes shall not be reused unless approved by the Department.
15.2.16 Conduit

Conduit shall be furnished and installed in accordance with the requirements of the CMS, SCDs and the TEM.

Conduit must be sized for the number and size of the conductors contained in the conduit. Cable fill shall meet the requirements of the National Electric Code and the TEM.

Interconnect conduit bank shall consist of 4-3 inch and 1-1.5 inch encased PVC conduits (see cross-sections in Appendix TC-10 for configurations). Only tracing wire shall be installed in the 1.5 inch conduit.

Interconnect conduit bank shall be as straight as possible. Any change in horizontal or vertical direction between pull boxes is to be accomplished with the natural deflection of the conduit. No conduit bends or angled deflections are permitted unless approved by the Department.

Interconnect conduit bank run lengths between pull boxes shall not exceed 500 ft.

Existing interconnect conduit bank in the south sidewalk of Long Street shall be extended from the existing 32-in. dia. concrete pull box on the SW corner of Long Street at Willow Street to a point east of the bridge over I-71 where the interconnect cables can be brought overhead on a wood utility pole.

Install a 48-in. dia. concrete pull box shall be installed at the west end and east end of the Long Street bridge over I-71.

Interconnect conduits in the south sidewalk of the Long Street bridge over I-71 between the 48-in. dia. concrete pull boxes shall be galvanized steel conduits in a flat (5 across) configuration.

At the wood utility pole at which the interconnect cables shall be brought up to the overhead interconnect cable:

- A 32-in. dia. concrete pull box shall be installed adjacent to (within 15 ft. of) the wood utility pole;
- 2 – 3-in. galvanized steel conduits shall be installed from the 32-in. dia. concrete pull box to the wood utility pole;
- 2 – 3-in. galvanized steel modified risers shall be installed on the wood utility pole; and
- A down guy shall be installed on the wood utility pole for the overhead interconnect cable running to the east.

Interconnect conduit bank shall be installed from Lester Drive to Elijah Pierce Avenue in the south sidewalk of Spring Street.

A 32-in. dia. concrete pull box shall be installed at the west end and east end of the Spring Street bridge over I-71.

Interconnect conduits in the south sidewalk of the Spring Street bridge over I-71 between the 32-in. dia. concrete pull boxes shall be galvanized steel conduits in a flat (5 across) configuration.
Interconnect conduit bank shall be installed from Long Street to Spring Street along Lester Drive. This shall connect directly to the interconnect conduit bank in the south sidewalk of Long Street and to the interconnect conduit bank in the south sidewalk of Spring Street.

Interconnect conduit bank shall be installed from Long Street to Spring Street along Elijah Pierce Avenue. This shall connect directly to the interconnect conduit bank in the south sidewalk of Long Street and to the interconnect conduit bank in the south sidewalk of Spring Street. If a bridge structure lies in this path, the interconnect conduits in the bridge structure shall be galvanized steel conduits in a flat (5 across) configuration. A 32-in. dia. concrete pull box shall be installed at each end of a bridge structure.

Interconnect conduits and signal conduits shall be combined into a single conduit bank where they run in the same direction. However, the signal conduits are always in addition to the 4-3 inch and 1-1.5 inch interconnect conduits.

Conduit must be used for all signal wiring. Direct burial of cables is not permitted.

Signal cable conduits shall be encased PVC conduits.

A minimum of 2-2 inch conduits shall be installed for signal cable, but more shall be installed if space requirements make it necessary.

Conduits shall be positioned in the conduit bank to minimize the crossing of cables within each of the pull boxes.

Cable shall be installed in the conduits in such a manner as to maintain the same relative position throughout a run (for example: if a cable is in the bottom east conduit at one end of a run, it shall be in the bottom east conduit throughout the remainder of that run).

Cross-section drawings shall specify the cables that are installed in each of the conduits. Plans shall contain a cross-section drawing for each different conduit bank configuration depending on the number and sizes of conduits and the number and location of cables installed in the conduits.

Conduits from the access point pull box to the controller cabinet shall include one (1) empty 3-inch conduit, which shall be a spare.

Existing conduit shall not be reused.

**15.2.17 Cable and Wire**

Cable and wire shall be furnished and installed in compliance with CMS Items 625 and 732.19, SCDs and the TEM.

Unswitched power cable shall not be run inside of conduit, poles or pull boxes containing other signal cables; power cable must be run in its own individual conduit run.

480 volt lighting cables shall not be run inside of conduit, poles or pullboxes with signal cables. 480 volt lighting circuit conductors shall be kept physically separated from signal cables.

Lower voltage signal cables (2/C) shall be installed in conduits separate from the higher voltage cables (5/C, 7/C, and 9/C).
When the situation arises, lower voltage signal cables shall generally be installed in conduits above conduits containing higher voltage signal cables.

Utility company approval shall be obtained for the attachment of any interconnect cables to utility poles.

All abandoned cables shall be removed from aerial spans, conduit and pull boxes. Direct burial cables may be abandoned in place. Abandoned cables shall be disposed of by the DBT.

Signal messenger wire size shall be 3/8-inch diameter, if used.

Signal conductors shall conform to the City of Columbus field wiring hookup requirements included in Appendix TC-05.

No cable shall simply pass through a signal support or pedestal base. In other words, if a cable leaves a signal support or pedestal, it shall not enter another signal support or pedestal unless the cable connects to a traffic device on that signal support or pedestal.

Lead-in cable shall be provided in conduit. A minimum length of 5 ft slack shall be provided for all cable ends in pull boxes.

Coaxial interconnect cable shall be as specified in Section 15.2.11.1.

15.2.18 Equipment Removal, Salvage and Disposal

Traffic signal installation, including signal heads, cable messenger wire, strain poles, pedestrian poles, cabinet with controller and equipment, pull boxes, etc., shall be removed in accordance with CMS Item 632.36. In accordance with CMS Item 614.03, items shall not be removed until a new or temporary signal installation is in operation, unless otherwise directed by the Department.

The existing traffic flow monitor system, including camera, bracket, cabinet with equipment, riser, cable, etc., located on the south side of Long Street at the east end of the bridge over I-71 shall be removed and returned to the City of Columbus Division of Planning and Operations in accordance with Appendix TC-09. The traffic flow monitor shall remain in operation until the temporary coaxial interconnect cable plant is in operation.

Coaxial interconnect cable system, including coaxial interconnect cable, messenger wire, interconnect devices, cabinet with equipment, pole attachment hardware, etc. shall be removed and returned to the City of Columbus Division of Planning and Operations in accordance with Appendix TC-09.

The DBT shall notify the Department (who will notify the City of Columbus) 72 hours prior to the removal of any existing traffic signal equipment. All removals shall be performed in the presence of a designated representative of the Department.

Removed items that are to be salvaged shall be returned to the City of Columbus Division of Planning and Operations. Items to be returned shall include signal poles, vehicular signal heads, controller equipment and cabinets, pedestrian pushbuttons, pedestrian signal heads, cabinets, pedestrian poles, pull box lids, pull box frames, interconnect devices/cabinets/equipment, and traffic flow monitors/cabinets/equipment. The two 32-inch diameter concrete pull boxes located on the south side of
Long Street, at each end of the bridge over I-71 shall be removed and returned to the City of Columbus Division of Planning and Operations. The embedded steel pole, which is located on the SW corner of Long Street at Willow Street and is supporting interconnect cable, shall be removed and returned to the City of Columbus Division of Planning and Operations unless it is utilized to support non-permanent vehicular and/or pedestrian signal heads or a pushbutton. Other materials shall be disposed of by the DBT. The DBT shall notify the Department (who will notify the City of Columbus – Traffic Maintenance) and store the materials on site, suitably protected, at a designated location for pick up by City staff within 7 business days of notification by the DBT. The DBT may dispose of materials that are not picked up within the 7-day timeframe.

15.2.19 Final Acceptance and Guarantee
The DBT shall guarantee that the traffic control systems installed as part of this contract shall operate satisfactorily for a period of 90 days following completion of the 10 day performance test. In the event of unsatisfactory operation, the DBT shall correct faulty installations, make repairs and replace defective parts with new parts of equal or better quality. Equipment, material and labor costs incurred in correcting an unsatisfactory operation shall be borne by the DBT.

The guarantee shall cover the following items of the traffic control system: controllers, cabinet and associated equipment, detector units and interconnect items. Customary manufacturers’ guarantees for the foregoing items and all traffic control equipment shall be turned over to the City of Columbus – Traffic Maintenance following acceptance of the equipment.

15.2.20 Temporary Signals
Signalized traffic control operations shall be maintained at all times by use of existing, temporary, or new traffic signals. Temporary signals are required at any existing signalized intersection for which neither the existing nor proposed signalization will function appropriately at any given time. Temporary signals, if needed, shall be installed and operated in accordance with the TEM, OMFUDC and relevant SCDs. See Section 16.10 for additional temporary signal requirements.

15.3 Signing
The DBT shall design and install signing for the project, to include informational, guide, regulatory, and warning signs. The guide signing shall be as illustrated in the Conceptual Guide Sign Plan provided in Appendices TC-16A and TC-16B.

The DBT shall prepare the signing plan and determine final sign sizing and placement. The Conceptual Guide Signing Plan included in Appendices TC-16A and TC-16B shall be used as a template. All signs shown in the Conceptual Signing Plan shall be provided by the DBT. However, the plan should not be considered all-inclusive; additional signs that may be required shall be provided by the DBT.

The DBT is responsible for correcting any existing signing that conflicts with the proposed improvements, even if the existing sign locations are outside of the project improvement area. This applies to advance interchange guide signing (2 Mile, 1 Mile, lead-in, etc). All signs at any single affected location shall be replaced. Sign lighting shall be removed at all affected locations.

Where existing sign supports are to be reused, as shown on the Concept Guide Sign Plan (Appendices TC-16A and TC-16B), the DBT is responsible for analysis to confirm that the existing support is
structurally adequate to support the proposed signing. If it is determined that the existing support is not structurally adequate, a new support shall be installed.

Temporary signing is covered within the Maintenance of Traffic section.

15.3.1 Signing Design

All signing within the project area shall be new.

All freeway main line major guide signs shall be overhead mounted using standard ODOT support designs.

The mounting of overhead sign supports on bridges and other structures shall be minimized. The Department will consider bridge mounted signs on a case by case basis except on Spring Street and Long Street Bridges. In order for the Department to consider bridge mounted signs, the DBT shall demonstrate that the sign(s) are securely anchored to a bridge pier cap. Bridge mounted signs mounted mid-span or to the superstructure will not be considered. Signs shall not be bridge mounted unless permission has been received from the Department’s Project Manager in writing.

Beam supports of sizes larger than S4 x 7.7 that are subject to multidirectional impacts at intersections shall use the alternate connection. Support assemblies shall comply with TEM Section 240.

A minimum vertical clearance of 17 feet shall be maintained between the bottom of the sign and the highest pavement elevation at all overhead sign locations, to include all interstate and non-interstate roadways.

Sign post reflectors shall be provided on applicable post-mounted signs. See CMS Item 630.04 for signs that shall have reflectors. All listed post-mounted signs in 630.04 shall have reflector strips.

Mainline signs shall be within 100 ft of locations shown on the Conceptual Guide Sign Plan in Appendix TC-16.

Ramp signing shall be according to OMUTCD Figure 2E-39. The WRONG WAY locations shown in the figure shall include two (2) WRONG WAY (R5-1a) signs at each location (for a total of 4 signs). The lower of the two signs shall be mounted 12 inches above the near edge of pavement elevation. Red sign post reflectors shall be installed per CMS 630.04.

Interchange Exit Numbering (E1-H5) signs shall be in accordance with OMUTCD Section 2E.28 and Figures 2E-12 through 2E-14. Exit numbering for the interstate overlap(s) shall be the lower numbered interstate route (i.e. Interstate 70).

Reference Location Signs (D10-4, D10-5 and D10-H5a) shall be included on all mainlines and ramps. Backgrounds on Reference Location signs shall be blue.

Provide Structure Identification Signs in the approach direction of all mainlines and ramps.

Signing on city streets shall be as per the Columbus Sign Installation Manual included in Appendix TC-18. Sign gauges indicated in this manual are not valid. Sign thickness shall be as per ODOT SCD’s TC-52.10 and TC-52.20. Installation of ground-mounted signs and sign supports shall comply with City of
Columbus Division of Design and Construction Supplemental Specification 1630 included in Appendix TC-17.

Ground mounted lane use control signs shall be installed on all signalized approaches where dedicated turn lanes are present. Two signs shall be installed on each approach – one near the beginning of the diverging taper and a second near the stop line.

Appropriate signing on bicycle facilities shall be included according to OMUTCD Part 9.

### 15.3.2 Signs
All signs and supports within the project limits shall be new. Signs shall conform to the OMUTCD, the TEM, and the ODOT Sign Design Manual. Applicable signs shall use Clearview font and upper/lower case legends in accordance with CMS Item 630.04.

All signs shown on the Conceptual Signing Plan shall be furnished and installed by the DBT, as well as any other signs required by the OMUTCD.

Street name signs shall be provided and installed by the City of Columbus. The DBT shall notify the Department (who will notify the City) one (1) week prior to any roadway being opened.

### 15.3.3 Sign Poles and Structures
Sign pole and structure design and coating/painting shall comply with ODOT standard specifications. Refer to Section 14.4 for additional design information.

Overhead signs on city streets shall be mounted on mast arms that are of the same design and specifications as the signal mast arms. See Appendices TC-04 and TC-05. Sign supports shall be galvanized steel mast arm design.

Sign supports shall be galvanized steel mast arm design. A structure that diagonally spans the intersection and carries signs for multiple approaches is not permitted.

Color coating finish of sign supports on City streets shall comply with City of Columbus standard specifications included in Appendix TC-04. Sign supports on City streets shall be finished in a black color, Federal Color Number 27038.

Location of the mast arm sign supports shall conform to ADA requirements for clearance and placement. The center of the mast arm support pole shall be a minimum of 4.0 feet from the face of curb.

If overhead lane use control signs are used where dedicated turn lanes are present, the mast arm sign support shall be located as close to the beginning of the channelizing line as possible.

Minimum clearance from overhead electric wires shall comply with requirements of the National Electric Safety Code, Rule 232, and the requirements of the local power companies providing electrical service.

The sign support arm length shall be 2 feet beyond the far edge of the sign located farthest from the mast arm pole.
Sign support arms shall be ordered to proper length; arms shall not be cut off to comply with arm length requirements.

Mast arm sign supports shall not include luminaire extensions. Street lighting shall remain completely separate from the sign supports.

Sign supports shall comply with CMS Items 632.15 and 732.11 as well as the City of Columbus specifications and details included in the Appendix.

Mast arm sign supports shall be grounded in accordance with CMS Item 625.16.

### 15.3.4 Sign Lighting

Sign lighting shall not be provided.

Existing sign lighting shall not be reused. At locations where existing lighted signs are on reused supports, all existing lighting shall be removed. The existing signs shall be replaced per the CMS prior to removing the existing sign lighting.

### 15.3.5 Wayfinding Signs

City of Columbus Wayfinding Signs shall be installed at the locations and per the specifications included in Appendix TC-19.

Reflective sheeting on wayfinding signs shall conform to color standards set forth in Section 1A.12 of the OMUTCD and meet or exceed ASTM D 4956, Type IV requirements.

### 15.3.6 Sign and Support Removal

The DBT shall remove and dispose of existing signs and supports within the project limits that are to be eliminated or replaced, unless otherwise noted. Existing cantilever (ODOT Standard Construction Drawing TC-12.30) sign supports within the project limits on Cleveland Avenue, Jack Gibbs Blvd., and Long Street (total of 7 supports) that are to be eliminated or replaced shall be stored on the project site for pickup by the City of Columbus. The DBT shall notify the Department (who will notify the City of Columbus – Traffic Maintenance) and store the materials on site, suitably protected, at a designated location for pick up by City staff within 7 business days of notification by the DBT. The DBT shall dispose of materials that are not picked up within the 7-day timeframe.

### 15.4 Intelligent Transportation Systems (ITS)

**DEFINITIONS, ACRONYMS & ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AADT</td>
<td>Average Annual Daily Traffic</td>
</tr>
<tr>
<td>AAPC</td>
<td>APID Algorithm Parameter Class</td>
</tr>
<tr>
<td>AAPS</td>
<td>APID Algorithm Parameter Set</td>
</tr>
<tr>
<td>ADT</td>
<td>Average Daily Traffic</td>
</tr>
<tr>
<td>AMI</td>
<td>Alternate Mark Inversion</td>
</tr>
</tbody>
</table>
APC - Algorithm Parameter Class
APD - Avalanche Photo Diode
APID - All Purpose Incident Detection
APS - Algorithm Parameter Set
AUI - Attachment Unit Interface
AVI - Automatic Vehicle Identification
AVL - Automatic Vehicle Location
Bellcore - Bell Communication Research
BER - Bit Error Rate
B8ZS - Bi-polar 8 - zero substitution
CAU - Channel Access Unit - Channel Banks
CCTV - Closed Circuit Television
CID - Craft Interface Device
CIH - Central Instrument Houses
CISC - Complete Instruction Set Computer
COTA - Central Ohio Transit Authority
COTS - Commercial Off-The-Shelf
CMFMS - Columbus Metropolitan Freeway Management System
DACS - Digital Access Crossconnect Switch
DAT - Digital Audio Tape
dB - decibel
dBm - decibel referenced to 1 mW
DCP - Data Collection Period
DMS - Dynamic Message Sign
DS - Devices Serviced
E&M - Engineering and Maintenance
EIA - Electronic Industries Association
ERK - Emergency Restoration Kit
ERL - Echo Return Loss
FDP - Fiber Distribution Panel
FMS - Freeway Management System
FSE - Fiber Slack Enclosures
FXO - Foreign Exchange Office
FXS - Foreign Exchange Subscriber
GB - GigaByte (1 x 10^9 Bytes/Characters)
GPS - Geographical Positioning System
GRS - Galvanized Rigid Steel Conduit
HAR - Highway Advisory Radio
HDCP - Historical Data Collection Period
ICEA - Insulated Cable Engineers Association
IL - Individual Loop
IP - Internet Protocol
ITS - Intelligent Transportation System
KB - KiloByte (1 x 10^3 Bytes/Characters)
Kb/s - Kilobits per second
KHz - KiloHertz (1 x 10^3 cycles per second)
LAN - Local Area Network
LED - Light Emitting Diode
LFC - Local Field Controller
LVDS - Logical Vehicle Detector Station
MB - MegaByte (1 x 10^6 Bytes/Characters)
Mb/s - Megabits per second
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MHZ</td>
<td>MegaHertz (1 x 10⁶ cycles per second)</td>
</tr>
<tr>
<td>MDF</td>
<td>Main Distribution Frame</td>
</tr>
<tr>
<td>MFMS</td>
<td>Metro Freeway Management System</td>
</tr>
<tr>
<td>mm</td>
<td>millimeter (1 x 10⁻³ meter)</td>
</tr>
<tr>
<td>MM</td>
<td>MultiMode</td>
</tr>
<tr>
<td>MMF</td>
<td>MultiMode Fiber</td>
</tr>
<tr>
<td>MTBF</td>
<td>Mean Time Between Failures</td>
</tr>
<tr>
<td>MTTR</td>
<td>Mean Time To Repair, manufacturer support</td>
</tr>
<tr>
<td>N</td>
<td>Newtons</td>
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<tr>
<td>NEBS</td>
<td>Network Equipment Building System</td>
</tr>
<tr>
<td>NEMA</td>
<td>National Electrical Manufacturers Association</td>
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<tr>
<td>NFS</td>
<td>Network File System</td>
</tr>
<tr>
<td>nm</td>
<td>nanometer (1 x 10⁻⁹ meter)</td>
</tr>
<tr>
<td>NMS</td>
<td>Network Management System</td>
</tr>
<tr>
<td>Node</td>
<td>Communication transmission equipment site that provides wire termination or wireless link for connecting user devices to the Network</td>
</tr>
<tr>
<td>NTCIP</td>
<td>National Transportation Communications for ITS Protocol</td>
</tr>
<tr>
<td>OAM&amp;P</td>
<td>Operations, Administration, Maintenance and Provisioning</td>
</tr>
<tr>
<td>OC</td>
<td>Optical Carrier</td>
</tr>
<tr>
<td>OSF</td>
<td>Open Systems Foundation</td>
</tr>
<tr>
<td>OSP</td>
<td>Outside Plant</td>
</tr>
<tr>
<td>OSU</td>
<td>Ohio State University</td>
</tr>
<tr>
<td>OTDR</td>
<td>Optical Time Domain Reflectometer</td>
</tr>
<tr>
<td>PC</td>
<td>Personal Computer</td>
</tr>
<tr>
<td>PCB</td>
<td>Printed Circuit Board</td>
</tr>
<tr>
<td>PCM</td>
<td>Pulse Code Modulation</td>
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<tr>
<td>PET</td>
<td>Protected Entrance Terminal</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>PSTN</td>
<td>Public Switched Telephone Network</td>
</tr>
<tr>
<td>RAID</td>
<td>Redundant Array of Inexpensive Disks</td>
</tr>
<tr>
<td>RAM</td>
<td>Random Access Memory</td>
</tr>
<tr>
<td>REA</td>
<td>Rural Electrification Administration</td>
</tr>
<tr>
<td>RGB</td>
<td>Red Green Blue</td>
</tr>
<tr>
<td>RISC</td>
<td>Reduced Instruction Set Computer</td>
</tr>
<tr>
<td>RMS</td>
<td>Ramp Metering System</td>
</tr>
<tr>
<td>RPU</td>
<td>Remote Processing Unit</td>
</tr>
<tr>
<td>RTMS</td>
<td>Remote Traffic Microwave Sensor</td>
</tr>
<tr>
<td>SCSI</td>
<td>Small Computer Smart Interface</td>
</tr>
<tr>
<td>SLP</td>
<td>Speed Loop Pair</td>
</tr>
<tr>
<td>SM</td>
<td>Single Mode</td>
</tr>
<tr>
<td>SMF</td>
<td>Single Mode Fiber</td>
</tr>
<tr>
<td>S/N</td>
<td>Serial Number</td>
</tr>
<tr>
<td>SNMP</td>
<td>Simple Network Management Protocol</td>
</tr>
<tr>
<td>SONET</td>
<td>Synchronous Optical Network</td>
</tr>
<tr>
<td>SQL</td>
<td>Structured Query Language</td>
</tr>
<tr>
<td>SQPR</td>
<td>Software Quality Program Generic Requirements</td>
</tr>
<tr>
<td>SSI</td>
<td>Surface Systems Incorporated</td>
</tr>
<tr>
<td>STS</td>
<td>Synchronous Transport Signal</td>
</tr>
<tr>
<td>TCP</td>
<td>Transmission Control Protocol</td>
</tr>
<tr>
<td>TEK</td>
<td>Tektronix</td>
</tr>
<tr>
<td>TIMS/ERL</td>
<td>Transmission Impairment Measurement Set/Echo Return Loss</td>
</tr>
<tr>
<td>TLP</td>
<td>Transmission Level Point</td>
</tr>
<tr>
<td>TL1</td>
<td>Transaction Language 1</td>
</tr>
<tr>
<td>TMC</td>
<td>Traffic Management Center</td>
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</tbody>
</table>
Overview - Columbus Metro Freeway Management System (CMFMS)

The CMFMS is a regional system that is designed to reduce freeway congestion by informing motorists of current and upcoming traffic conditions, incidents, or other hazards. Intelligent Transportation (ITS) devices are deployed as part of the CMFMS to help achieve this goal.

The ODOT District 6 ITS is composed of multiple field devices using various methods to communicate to the Columbus Traffic Management Center (TMC).

Depending on the DBT’s final alignment, they may expect to:

- Relocate Node 6
- Relocate/Replace 2 CCTV Cameras
- Install 1 new CCTV Cameras
- Install new conduit and fiber
- Remove 1 existing RMS
- Install 2 new RMS
- Remove and replace multiple VDS
- Provide temporary devices/fiber

The following is a list of components that are included in the ODOT D6 ITS for further reference later in the section:
• 24 Strand Single-Mode Fiber (SMF) Optic Cable
• 48 Strand Multi-Mode Fiber (MMF) Optic Cable
• 72 Strand Single-Mode Fiber Optic Cable
• Vehicle Detector Stations (VDS)
• Ramp Meter Stations (RMS)
• Closed Circuit Television (CCTV) Cameras
• Fiber/Network Nodes
• Overhead Dynamic Message Signs (DMS)
• Highway Advisory Radio (HAR)

The ODOT D6 ITS consists of a total of twelve (12) fiber access network nodes throughout the Columbus metro area that branch out to field devices. The node designated ‘NODE 6’ is located within the project limits.

A significant amount of the ITS equipment sites communicate to the head end Freeway Management System (FMS), located at the Columbus TMC, through ‘NODE 6’ and other fiber optic cables running within the project limits. These sites allow the TMC to detect and respond to freeway incidents.

Any loss of communication to the field devices reduces the TMC’s ability to mitigate traffic congestion. It is essential to the CMFMS that the fiber optic trunk cables remain intact until new fiber optic cable runs are completely installed and operational. If communications are lost and not repaired within the specified time period, the DBT shall be assessed time based disincentives in accordance with Section 15.4.7 System Device Downtime.

15.4.1 Materials

The DBT shall be solely responsible for verifying that all equipment purchased and installed for the ITS is compatible with the current system and shall communicate seamlessly with the HEAD-END system. Compatible equipment is specified herein. The Department shall not be responsible for equipment that is purchased and/or installed that is not compatible. It is the DBT’s responsibility to make the appropriate contacts, in order to make this determination. All equipment that is being relocated during construction shall be securely stored at the project field office. Any equipment that will not be reused by the DBT shall be separately secured at the project field office to await pickup by the D6 ITS ENGINEER. Any equipment lost or damaged during storage shall be the DBT’s responsibility and shall be replaced at no cost to The Department. The DBT shall notify the DISTRICT 6 D6 ITS ENGINEER that items are awaiting pickup and shall keep the items secured until picked up.

15.4.1.1 Warranty

All new equipment shall be unused and shall be given a Five (5) Year bonded warranty by the DBT for parts and labor.

The purpose of the bonded warranty period is to ensure that all equipment components function in accordance with the specifications over an extended length of time, and to provide continuing assistance to the Department in all phases of system operation as required. For a Five (5) Year period, beginning at construction acceptance of the system, the DBT shall be responsible for the proper performance of all
equipment. The DBT is also responsible for obtaining technical assistance from the equipment manufacturers and/or suppliers in cases where programming, operational or adjustment difficulties are encountered; the DBT shall be responsible for providing training to the Department on equipment if new or unusual problems/repairs are discovered during the bonded warranty period.

15.4.2 Vehicle Detector Station (VDS)

The CMFMS relies on the data collected by VDS to correctly operate ramp meter stations, generate travel time messages, and detect freeway incidents. Therefore, VDS surveillance coverage after project completion shall be equivalent to prior coverage. New VDS locations shall be in approximately the same location as the existing locations to be removed (within 250ft).

Existing VDS provide CMFMS with volume, occupancy, and speed data that is collected at 20 second intervals. There are a combination of single loop and dual loop stations. The current stations utilize proprietary software that is run on a 170 traffic controller and communicate via a serial over multimode fiber optic network that is terminated at a field ethernet/single mode fiber optic hub.

Existing VDS locations that will be affected by project:

- V1010 – Single loop detector stations covers N I-71 lanes north of Long St, and S I-71 lanes south of Long St. Approx Mile Marker 108.85

Any VDS equipment disturbed during construction process shall either be turned over to ODOT D6 ITS ENGINEER or stored on project site.

Upon completion of reconstruction of the interchange, DBT may reuse existing traffic control equipment if they choose to install new loop detectors in pavement, provided the equipment is undamaged and still operational. All equipment, loop configurations and terminations shall be consistent with the original VDS design (i.e. same equipment, if originally a dual loop station then install a dual loop station). Dual loop stations have a loop separation value of 28 ft.

DBT may install radar detection equipment in place of any or all of the loop detector sites as long as it can be shown to ODOT D6 ITS ENGINEER that all lanes have adequate detector coverage. In addition, the radar detector must be compatible with the current FMS and system RTMS software. Compatible radar detector is EIS RTMS X3/G4 with two communication lines having RS232/RS485/RS422, as determined by the ODOT D6 ITS ENGINEER. When the DBT decides to use RTMS detection a DIGI Serial Terminal Server is required for communications. The DIGI Model shall be Digi Model TS2 H MEI Port Terminal Server, or weather-hardened equivalent Digi model supporting reverse telnet, and RS422/RS232/RS485 communications. Ethernet network connectivity is required at any site where radar
detector equipment is to be installed, and shall use equipment equivalent and compatible with existing ODOT FMS equipment. In cases where two RTMS units are needed to meet lane coverage requirements, a NEMA 3R cabinet shall be installed on pole of additional RTMS units and shall be wired as per ODOT D6 ITS ENGINEER. All necessary cabling shall be included in the cost for the VDS.

Prior to acceptance of the VDS installation and equipment, a sixty (60) day testing period shall be conducted to ensure that the equipment is functioning and communicating as specified. There shall be a Five (5) Year bonded warranty period for all equipment and labor that shall commence after Final ( Entire) Project Acceptance has been delivered to the DBT by the Department in writing.

The DBT shall request the standard drawings for the VDS after the DBT has submitted a copy of the proposed plans. The ODOT D6 ITS ENGINEER shall have ten (10) BUSINESS DAYS to submit the standard drawings for the VDS to the DBT after request has been made.

15.4.2.1 Speed / Traveltime Coordination

In addition to the ODOT District 6 Vehicle Detector Stations, ODOT Central Office has a contract with a vendor to install and maintain speed sensors at various locations on the freeways. The DBT shall coordinate all work with this project so as to limit downtime for these project-maintained speed sensors. The sensors should be maintained through the duration of the project. Relocation of sensors will be performed by the sensor vendor.

The DBT shall notify the Department (who will notify George Saylor in the ODOT Office of Traffic Engineering) a minimum of 10 calendar days in advance of needing any speed sensor(s) relocated.

15.4.3 Ramp Meter Station (RMS)

The existing ramp meter station (RMS) at the Long St to N I-71 ramp shall be removed due to ramp reconfiguration. All RMS equipment from that location shall be turned over to ODOT D6 ITS ENGINEER and is not to be reused. Two new RMS locations shall be installed at Spring St. to N I-71 and Spring St. to E I-670.

RMS sites are to be installed using ODOT typical drawings. The DBT shall use the specifications located in Appendix TC-20 RAMP METER SPECIFICATIONS to determine ramp type and ramp meter location. The DBT shall utilize the included drawings to ensure that the ramp meter locations shall provide the minimum amount of acceleration distance to achieve the preferred merge speed (Freeway Design Speed – 10 = Preferred Merge Speed). The DBT shall also ensure that the appropriate amount of queue storage is available prior to reaching the ramp meter station. The ramp shall be capable of storing 10% of the average peak hourly volume using an average vehicle length of twenty-five (25) feet. Controller equipment, communications equipment and RMS software must be equivalent and compatible with FMS software and other existing RMS sites.

Ramp Meter Specifications are included in Appendix TC-20.

15.4.4 ITS Equipment Site Locations – Safe Access
All ITS related equipment sites including VDS, RMS, CCTV, and Fiber Nodes to be installed during this project shall be installed in locations that provide safe access for the Department’s maintenance personnel. Safe Access requires that any equipment cabinet location, ground mount or pole mount, have the following characteristics:

- Located outside the clear zone as defined in Section 600.2 of the Location & Design Manual Volume 3 or protected by guardrail or concrete barrier meeting length of need and offset requirements as defined in Section 602 of the Location & Design Manual Volume 3.
- Shoulder width of at least 10 ft for a distance of at least 250ft upstream and downstream of cabinet for adequate deceleration clearance.
- Cabinet shall not be installed on ground that exceeds 10% grade.
- 3ft x 3ft square concrete work pad shall be installed at each cabinet per ODOT specification 633.11 CONTROLLER WORK PADS.

15.4.5 Fiber Optic Interconnect Cable

The CMFMS utilizes fiber optic interconnect cables to establish network communications with field devices. The following three (3) fiber optic trunk cables run through the proposed construction area:

1. 24 Strand SMF Cable is located in the median and is terminated in the ‘NODE 6’ cabinet. This fiber cable serves as the backbone network communication line for all field devices located on the following routes:
   a. I-71 from High Street to Powell Rd
   b. I-270 from US-33/SR-161 to Westerville Rd
   c. SR-315 from Ackerman to I-270
   d. I-670 from SR-315 to Cleveland Ave

2. 48 Strand MMF Cable provides a redundant communication ring and is spliced through every ITS field device. This fiber cable communicates with ITS devices on the following routes:
   a. I-71 from I-70 to E. North Broadway

3. 72 Strand SMF Cable run serves as the backbone network communication line for all devices on the following routes:
   a. I-670 from I-71 to I-270
   b. I-270 from SR-161 to Hamilton Rd (wireless communication sites that tie into fiber cable I-270/I-670 ITS cabinet)
   c. I-70 from E I-270 to I-71

Where it is necessary to pull new fiber cable, the DBT must supply fiber optic cable, pigtailed, and enclosure kits that meet or exceed ODOT fiber optics cable and equipment standards provided in the specifications in Appendix TC-20.
15.4.5.1 Splicing
Prior to performing scheduled splicing work at any location, the DBT shall obtain the fiber splicing diagrams from the ODOT D6 ITS ENGINEER. The DBT shall give the ODOT D6 ITS ENGINEER two weeks to prepare and supply the fiber splicing diagrams prior to performing any splicing work. It shall be the DBT’s responsibility to avoid damage to the fiber optic cables and minimize potential downtime during fiber splicing.

15.4.5.2 Conduit and Pull Boxes
All newly installed conduit runs containing fiber optic cable shall be comprised of two premanufactured (2) - 4” multi cell conduit containing four (4) each 1¼” inner ducts, stacked vertically, to allow capacity for current ODOT FMS fiber optics and anticipated additional City of Columbus fiber optic cables. Conduit shall be solid orange (not painted) conforming to Federal Specification WC-1094A, Rigid Non-metallic conduit (PVC) and ASTM Specification No. F512 Schedule 80. Conduit shall be installed in all median walls and as directed by the ODOT D6 ITS ENGINEER.
For buried conduit, 32” round pull boxes shall be installed and spaced no more than 500 feet apart. For conduit within barrier walls, 36” median barrier wall pull boxes shall be installed and spaced no more than 1000 feet apart. Additionally, each median barrier wall pull box shall be connected to a 32” round pull box approx 5 feet to the right of the edge of pavement using a 4” multi-cell connecting lateral conduit crossings, perpendicular to the roadway. At least 100 feet of fiber optic cable slack shall be coiled and stored in all 32” pull boxes.

The DBT shall install a two (2) – 4” multicell conduits that shall connect Node 6 to the existing conduit on I-670 near Cleveland Ave.

A pull wire shall be installed in each duct following installation.

Standard Drawings for Conduit and Pull Boxes are included in Appendix TC-20.

15.4.5.3 Tracer Wire
Tracer wire shall be physically secured directly above the top conduit of all newly-installed 4” conduit runs using wire plastic zip ties spaced 10 feet apart. Tracer wire shall be no smaller than #12 AWG wire. The wire shall be insulated, yellow in color, and constructed of copper clad stainless steel. Approximately 10 ft. of slack of the tracer wire shall be left inside the adjacent pull-boxes connecting the conduit runs. In situations where a fiber optic cable marker, (See 15.4.5.4 “Type 2”) is to be installed in conjunction with the tracer wire, the tracer wire shall be run through the marker and connected to terminals at the top of the marker.

15.4.5.4 Fiber Optic Cable Markers
Fiber Optic Cable Markers shall be installed as directed by the ODOT D6 ITS ENGINEER and/or at every pullbox containing fiber optic cable and shall be one (1) of two (2) types:

TYPE 1 – COTTMARK 511, FRICK FLEXPOST, or CARSONITE CURV-FLEX MARKER
TYPE 2 – COTT BIGFINK, FRICK TESTPOST, or RHINODOME TEST STATION
The fiber optic cable markers shall be 6 feet in length and shall be securely placed in the ground at a depth of two (2) feet. Care shall be taken during installation not to damage any underground conduit in the vicinity. The DBT shall use a TYPE 2 marker when the path of the fiber crosses underneath a roadway and when capable shall place a marker on both sides of the roadway at crossing. The DBT shall connect tracer wire to terminal at top of TYPE 2 marker. TYPE 1 markers shall only be placed on straight fiber runs between pull-boxes in the shoulder and the DBT shall be limited to the use of TYPE 1 markers so that a TYPE 2 marker shall be placed between any two (2) TYPE 1 markers. TYPE 1 markers shall not be placed in succession down a fiber path. The markers shall be orange in color and shall have the following information located on the upper portion of the marker in a readable format:

**WARNING**

**CONTACT OUPS 72 HRS BEFORE DIGGING**

**ODOT D6 ITS FIBER OPTIC CABLE**

**AND**

**CITY OF COLUMBUS TRAFFIC FIBER OPTIC CABLE – 614-645-7393**

**15.4.6 Power, Grounding, and Surge Suppression – ITS**

**15.4.6.1 Power**

The DBT is responsible for contacting AEP / City of Columbus DOPW(P) prior to making any assumptions about new or current power services. The Department will not be held liable for any construction delays in getting power services approved by either service provider. The DBT shall contact the ODOT D6 ITS ENGINEER to obtain any additional information, not located in the appendix, regarding existing power services and devices associated with each power service. All new or updated power services shall be per ODOT specification 625.15 “Power Service”, shall be non-metered, and shall be added to either one of the ODOT ITS current accounts shown below depending on which service is in the area:

- City of Columbus DOPW(P) - 087-39-24508-01
- American Electric Power (AEP) – 103-588-420-0

All power services shall be run through a separate 2” conduit and be separated from all other cables using an 18” pull-box marked “ELECTRIC”. The pull-box shall follow 725.08 “Portland Concrete Pull Boxes” of the ODOT Construction and Material Specifications.

**15.4.6.2 Grounding**

All appropriate grounding shall be performed by the DBT and shall be performed per ODOT Construction and Material Specification 625.16 GROUNDING. The grounding system at the cabinet locations shall be tied into the grounding system at the power source. Having both grounding systems connected together shall not be dependent upon the distance between the two sites. The grounding wire shall be attached to the ground rod by exothermic welding.
15.4.6.3 Surge Suppression

All cabinets shall have a surge protection device on the incoming power cable per ODOT specification 733.03.A.2.f. All VDS and RMS cabinets shall have loop lead-in protection per ODOT specification 733.03.A.2.f. In addition to the surge suppression provided on the incoming power to the cabinet, surge suppression shall be installed protect power outlets to all devices placed in all cabinets. This surge suppression shall be capable of being plugged into a standard 5-15 outlet. This device shall meet the following minimum specifications:

- 9 NEMA 5-15 outlets
- Shall mount in a standard 19” rack
- Energy Handling – 1280 Joules
- UL 1499 let through rating – 400 Volts
- Surge Current Rating – 50,000 Amps
- Output Current – 15 A

15.4.7 System Device Downtime

The intent of this section is to specify what parts of the system need to remain in service during construction, maximum downtime allowed for each device, and consequences for non-compliance.

15.4.7.1 Coordination

Before work is performed, the Project Engineer, the DBT, and the ODOT D6 ITS Engineer shall jointly conduct a pre-construction operational status check of all existing ITS devices and each device’s communication status with the Traffic Management Center (TMC), including existing ITS devices’ location and status, and provide a copy of the certified list of the existing ITS devices within the project limits to the DBT. The status list shall include the operational, defined as having full functionality, and the non-operational components.

The DBT shall coordinate with the Project Engineer and the ODOT D6 ITS Engineer at least 72 hours in advance of interrupting existing ITS devices’ communication with the TMC that will result in the elements being non-operational or offline. If the construction activities require existing ITS devices to be non-operational or off-line, the DBT shall make necessary arrangements to install temporary and/or relocated elements so that the allowable downtime is not exceeded, as outlined in Section 15.4.7.3. The DBT shall notify all parties (Project Engineer, ODOT D6 ITS Engineer, and City of Columbus Signal System) at least 72 hours prior to starting excavation activities.

It is the DBT’s responsibility to request all documents showing proposed fiber termination diagrams, fiber optic cable locations, as well as device locations. The Department shall not be responsible for loss of communications due to failure of the DBT to request and receive all supporting documentation from the ODOT D6 ITS ENGINEER prior to beginning work. The ODOT D6 ITS ENGINEER shall have two weeks to provide the DBT any requested documentation.

15.4.7.2 Communication Outage and Restoration Notification Requirements
An outage is a loss of primary or secondary communication between the CMFMS field devices, fiber optic interconnect cables and the TMC. Restoration is the regain of communication between the CMFMS field devices, fiber optic interconnect cables and the TMC.

The ODOT D6 ITS ENGINEER shall provide notification via email (primary) and hardcopy (secondary) to the DBT of all outages and restorations of ITS devices located within the construction limits that occur during the project timeframe. The notification shall list all affected devices, date and time of the outage, date and time of the restoration, cause of the outage, and the party responsible for the outage and restoration. The ODOT D6 ITS ENGINEER shall be the sole determining party in determining whether an outage was caused by work done by the DBT.

Downtimes shall begin using the date/time stamp from the Department’s email notifying the DBT of the device outage. Downtimes shall end using the date/time stamp from the ODOT email notifying the that the affected device passes the operational test conducted by the ODOT D6 ITS ENGINEER.

15.4.7.3 Maximum Downtimes and Repairs
If the DBT is notified that existing ITS elements have been damaged, have failed or are not fully functional due to the DBT’s activity, the damaged or failed ITS devices, excluding structure-related devices, shall be repaired or replaced, at the DBT’s expense, within the allotted timeframe for that particular device. For structure-related devices, the DBT shall install temporary or portable ITS devices within the allotted time-frame.

If fiber-optic cables are damaged due to the DBT’s activities, the DBT shall install new fiber-optic cables from an original splice point or termination to an original splice point or termination, unless otherwise authorized in writing by the ODOT D6 ITS ENGINEER. Fiber-optic cables shall be spliced in the weatherproof splice enclosures as specified in the ITS FIBER OPTIC SPECIFICATIONS found in Appendix TC-20. The amount of new fiber optic cable slack with the splice enclosures the number of new fiber optic cable splices shall be equivalent to the amount of slack and splices existing before damage or as specified in the plans, as determined by the ODOT D6 ITS ENGINEER. Core-Aligned Fusion Splicing shall be required.

The DBT shall demonstrate that repaired or replaced devices operate in a manner equal to or better that the replaced equipment. If the DBT fails to perform required repairs or replacement work within the allowable downtimes listed below, the Department may have the repair or replacement work performed by other means and the cost shall be deducted from the monies due to the DBT.

For this section, an incident shall be defined as any occurrence in which communications is disrupted to any of the items due to work being performed for the project, not to be determined by time frame in which it is down. i.e. “an incident that disrupts communication for 24 hours is the same as an incident that disrupts communication for 1 hour.”

1. 24 Strand Single Mode Fiber Optic Cable
   - Allowable downtime: 12 hours per incident (max. 2 incidents per entire project)
   - Disincentive: $400 / hour – beginning after the allowable downtime
• After the max. 2 incidents there shall be no allowable downtime.
  ▪ The disincentive shall apply at time of disruption.

2. 48 Strand Multi-Mode Fiber Optic Cable
• Allowable downtime: 24 hours per incident (max. 2 incidents per entire project)
• Disincentive: $400 / hour – beginning after the allowable downtime
• After the max. 2 incidents there shall be no allowable downtime.
  ▪ The disincentive shall apply at time of disruption.

3. 72 Strand Single-Mode Fiber Optic Cable
• Allowable downtime: 24 hours per incident (max. 2 incidents per entire project)
• Disincentive: $400 / hour – beginning after the allowable downtime
• After the max. 2 incidents there shall be no allowable downtime.
  ▪ The disincentive shall apply at time of disruption.

4. CCTV Cameras
• Allowable downtime: 72 hours
• Disincentive: $400 / day (or any portion thereof)
• Note: CCTV cameras that are located within the project limits and are to be removed and relocated by the DBT are NOT included in this downtime requirement.
The DBT shall have one of the two defined cameras installed and communicating (video and ptz controls) with the Head-End System, at any given time during construction. These cameras are defined as the following:
  • Camera #41 – I-670 @ I-71
  • New Camera as specified in Section 15.4.9

5. Fiber Nodes
• Allowable downtime: 48 hours per incident (max. 4 incidents per entire project **planned or unplanned**)
• Disincentive: $1600 / hour
• Note: Fiber Node 6 is located within the project limits and shall be included in the maximum 48 hour downtime requirement for all purposes. Special arrangements must be made and be in place before taking this node offline for removal and relocation. Node 6 shall not be considered back online until communication has been restored to all items listed below.
  ▪ 24 Strand Single-Mode Fiber Optic Cable
  ▪ 48 Strand Multi-Mode Fiber Optic Cable
  ▪ 72 Strand Single Mode Fiber Optic Cable
  ▪ All associated devices as noted in the allowable downtime section

The DBT shall make special arrangements to have all work that includes disruption to the ITS done over the weekend to limit the disruption to the ITS.

15.4.8 Closed Circuit Television (CCTV) Camera System Expansion
SIGNALIZATION, MISC.: CCTV CAMERA ASSEMBLY (SPECIAL)

15.4.8.1 Description

This section is intended to provide details of the installation and the testing for the expansion of the CCTV System. The proposed Freeway Management System utilizes the optical communication system for the transmission of video stream and camera control data, which will be controlled from the TMC. The DBT shall be required to provide the HONEYWELL CCTV camera assembly. The DBT shall demonstrate the functionality of the provided CCTV system with the existing CMFMS system for seamless control functionality and operation. There shall be three cameras involved with this project. One camera shall be new and two shall be existing to remain or for relocation by the DBT. Existing cameras that are to be relocated shall be securely stored by the DBT on the job site. Any cameras damaged during storage shall be replaced at the DBT’s expense. The existing camera locations (red dot) are shown on Picture A. If the existing cameras need to be removed, they shall be relocated by the DBT so that the same area currently monitored prior to construction shall be capable of being monitored after construction ends, as well as the area on I-71 between Spring Street and Broad Street. The CCTVs shall be capable of identifying whether the two (2) new proposed ramp meter stations are in meter or non-meter status by viewing signal heads and LED’s. “Monitored” shall be defined as being able to view all sections of the roadway clearly and being able to determine road closures and incidents on a lane by lane increment. Before installation of all new or relocated cameras, the DBT shall capture video at proposed locations and heights. The video shall show a 360 degree view of freeway at proposed locations and heights and shall stop for a minimum five (5) minutes to show freeway views in each direction. The ODOT D6 ITS ENGINEERs shall be the sole approver of the proposed location and shall determine if it is useable video.
The DBT shall furnish and install the CCTV equipment so that the specified areas can be monitored via the cameras and safely accessed for maintenance and repair.

The CCTV System shall consist of the following elements:

- **Camera Assembly.** The dome camera assembly shall consist of a color CCTV camera, motorized zoom lens, and, pan/tilt unit inside a dome enclosure. Mounting hardware and all cabling are required to interface the camera assembly with the equipment in the field cabinet. The camera control data protocol shall be compatible with the existing protocol used in the TMC. Additional specifications for the camera assembly can be found in Section 15.4.8.6.

- **CCTV Control cable.** The CCTV Camera Assembly unit shall be provided with at least 100 ft. of CCTV Control cable. This cable shall be a composite cable as described in Section 15.4.9.2 ITEM 632E90400 SIGNALIZATION, MISC.: CCTV CONTROL CABLE.

The work shall include the installation and integration of the central communications equipment related to the operation of the CCTV equipment at the TMC.

### 15.4.8.2 CCTV Control Cable

#### SIGNALIZATION, MISC.: CCTV CONTROL CABLE

#### 15.4.8.2.1 Coaxial Cable

Type RG-59 coaxial cable shall be used to connect the camera to the CCTV field equipment Cabinet. Coaxial compression connectors, crimps, and other required materials shall be furnished in the price of this bid item. All connectors shall be electrically and mechanically compatible and shall be of the compression type. The RG-59 cable shall be quad shielded to prevent off the air interference. Dissimilar metals in mating connectors shall not be allowed. Connector bodies shall be constructed of aluminum with a protective silver iridite finish or other suitable non-corrosive material.

#### 15.4.8.2.2 Power Cable

The power cable between the CCTV Camera Assembly and the field Controller Cabinet shall be installed in accordance with the CCTV equipment manufacturer’s recommendations. The Dome power cable shall be minimum 1 pair #18/1 AWG.

The heater/blower power cable between the CCTV Camera Assembly enclosure and the field Controller Cabinet shall be installed in accordance with the CCTV equipment manufacturer’s recommendations. The Dome power cable shall be minimum 1 pair #18/1 AWG.

#### 15.4.8.2.3 Control Cable

The Control Data cable between the CCTV Camera Assembly and the Intersection Controller Cabinet shall be installed in accordance with the CCTV equipment manufacturer’s recommendations. The control cable shall be minimum 2 pair #20 AWG.
All cables shall be of sufficient length and weather resistant, installed with strain relief, and jacketed in a nylon mesh, or other material approved by the ENGINEER, so as to provide protection from abrasion.

The DBT shall supply conduit in/on the pole as directed by the Lowering-Device provider. The only cable permitted to move within the pole or lowering device during lowering or raising shall be the stainless steel lowering cable. All other cables must remain stable and secure during lowering and raising operations.

15.4.8.3 Materials
All materials furnished, assembled or installed shall be new, corrosion resistant, and in strict accordance with ODOT standard specifications, industry standards and the details that are shown in the plans. The DBT shall supply CCTV system and related equipment including:

- Color CCTV dome camera system: ¼" format CCD color camera, motorized zoom lens, dome camera enclosures, pan/tilt drive unit, receiver driver unit, mounting hardware, cables in the field locations.
- CCTV lead-in cable to connect the camera unit to the communication interface.
- Power supply, Treehaven Technologies – Roadway Vision Systems Field Box, Model RVSFB120ERAL
- And related equipment as shown in the Plans.

The DBT shall furnish a camera pole. The details are shown in the plans.

15.4.8.4 CCTV Data Communications Functions
- Communications with central shall accept and transmit data using the existing SC-130 Diamond SmartScan protocol.
- The camera control data shall be identical to the existing Diamond/Ultrak/Honeywell Electronics field equipment.
- The proposed fiber communications plant shall be utilized for all camera pan, tilt, and zoom functions.

15.4.8.5 Camera Control Functions
1. Allows pan, tilt, and zoom control of the camera locally and remotely from the TMC/ODOT network.
2. Requires a "hold in position" command from a terminal to park a camera.
   a. Generates an "in use" flag on the camera icon at the operator's display.
   b. Identifies the user requesting the park command on the flag.
   c. Times out the park command automatically. Requires a manual reset to continue holding the camera.
   d. The park time for any individual is controllable from the operator's terminal.
e. An indefinite park period is permitted from the operator's terminal only.

**15.4.8.6 CCTV Field Equipment**
The CCTV field equipment shall consist of the following items on a per camera basis:

a. Color Camera with 3-119 Millimeter Lens (35X Optical Zoom)

b. Acuix® or HD6® Yoke Assembly
c. Weatherdome Top
d. Clear Bottom Dome
e. Heater / Blower Option
f. Junction Box with Duplex Outlet and Surge Protection
g. One-hundred (100) foot Camera Control Cable
h. Rack Mount Frame.
i. Surge protection for camera data and video at both top of pole and in cabinet.
j. Surge protection for cabinet power and protected power outlets

**15.4.8.7 CCTV Monitors and Video Racks**
Refer to Section 15.4.10.1 VIDEO CODEC GENERAL for details regarding the video system.

**15.4.8.8 Testing and Certification**
The DBT shall verify that the camera can be controlled from the traffic management center.

The DBT shall verify that the operator can pan, tilt, and zoom the camera from the traffic management center.

The DBT shall verify that the camera views clearly show the area that is specified and shall clearly be able to identify incidents and the lane that they are present.

**15.4.8.9 Training**

**General**
The DBT shall supply training for maintenance personnel in the operation and maintenance of any camera, video switching, and surge protection equipment and/or software that is considered new to the CMFMS.

Training shall be provided by personnel thoroughly familiar with the equipment operation. This may be the DBT's personnel, equipment manufacturer representatives, or a combination of the two. A complete course outline and summary of the experience and qualifications of the instructional personnel shall be submitted and approved by the ENGINEER prior to the start of training.
Recommended test equipment, literature and drawings for the classes shall be furnished by the DBT. At the conclusion of classes all items furnished, which are not currently owned by the Department, shall become the property of the Department.

15.4.8.10 Communication Utilizing Fiber-Optic Cable
The ITS elements shall communicate with the TMC via fiber-optic communication.

If fiber-optic communications are utilized, the DBT, in consultation with the Department’s Representative and ENGINEER, shall connect and test the existing fiber optic cable designated for communications between the ITS element’s locations and the associated hub with an OTDR. The selected fibers shall be capable of transmission of digital video in accordance with the video hardware manufacture specifications.

The DBT shall be responsible for making all necessary contacts and arrangements with the Department and/or the City for making these connections and conducting the necessary tests.

Camera Encoder shall be connected to the ODOT Network via an ODOT approved, DBT provided, Ethernet switch (Cisco 2960) compatible with the current communication system and fiber optic cable. Cables shall be run through a 32” pull box at the base of the CCTV pole.

All communication and data lines entering or leaving the cabinet shall be terminated in terminal blocks mounted on the input/communication panel. Surge protectors mounted on the panels shall be provided to protect each of these lines. Communication lines from and to the Fiber Optic/Wireless Transceiver/Repeater shall be connected to the communication surge suppressor, and then to the communications equipment. These Surge protectors shall be placed on both Ethernet RJ45 connections and Coaxial connections and shall be capable of withstanding a minimum 1 kA surge current.

15.4.8.11 Traffic Management Center
The TMC is located at 109 North Front Street, Columbus, Ohio. The DBT shall be responsible for furnishing all necessary cabling at the camera location and the TMC. The DBT shall be responsible for installing and connecting all cabling, connectors, distribution amplifiers and other equipment necessary to integrate this camera into the existing system. The DBT shall be responsible for the scheduling of work at the TMC and for coordination with the Department’s ENGINEERs to minimize the interference with other operations at the site and on the system. The DBT shall be responsible for supplying all necessary cabling for the video codec (encoder/decoder).

15.4.8.12 CCTV System Acceptance
A CCTV System Acceptance Test shall be performed to verify the system is in compliance with the specifications and shall include the following, at a minimum.
• All equipment shall be examined carefully upon delivery to verify that materials and workmanship comply with the ODOT standard specifications and with the technical specifications of the Contract Documents. The wiring, electrical components, connections and labeling shall be checked to determine conformance with the requirements. The DBT shall provide manufacturers’ certifications for environmental, mechanical, and electrical compliance. The DBT is responsible for acquisition, storage, and maintenance of all equipment until system acceptance.

• Ensure that field and TMC equipment installations are clean, complete, fully operational, and documented. Test each CCTV Camera Assembly for all camera functions including pan, tilt, zoom, and presets recall from the TMC using the video controller operator interface.

• Following successful completion of the Sixty-day (60) Performance Test and Construction Acceptance, a Five (5) Year bonded warranty period shall commence. The bonded warranty period shall start from the date of approved Final Acceptance Test of the system. The DBT shall repair defects attributable to the design, manufacture, delivery, installation, or startup processes at no expense to the Department.

• As part of the CCTV System Acceptance Test, the DBT shall conduct local unit tests, subsystem tests, and a complete system test. If any element of the CCTV System Acceptance Test fails, the equipment shall be repaired and the test shall be rerun on the failed element. If a component has been modified as a result of a failure, that component shall be replaced in all like units and the test shall be rerun for each unit. The DBT shall submit to the ENGINEER for approval a CCTV System Acceptance Test procedure, written description of any proposed equipment replacement or modification prior to conducting the work.

15.4.8.13 Shop Drawings Submission
Shop drawings and wiring lists for all equipment shall be submitted to the ODOT D6 ITS ENGINEER. Wiring lists for the internal manufacturer cut sheets for all electrical equipment included in the cabinet and at the TMC shall be included in the submission.

15.4.8.14 System Documentation
The DBT shall provide two copies of the equipment operating manuals for all CCTV equipment.

15.4.9 CCTV Pole, Type A

SIGNALIZATION, MISC.: CCTV POLE WITH LOWERING SYSTEM

The CCTV Pole shall be compatible with our current system and shall allow the camera dome to be mechanically lowered to the ground by cable for service / repair. The camera pole shall also be designed and placed so that the freeway segments shown on Picture B can be monitored for traffic incidents by the TMC. The lowering unit shall be of the same manufacturer and type that is currently used on the
CMFMS. This allows for a load capacity of 600 lbs. with a 4 to 1 safety factor on the suspension contact unit.

**Picture B: Reference Location of proposed view of new additional camera installation**

The freeway shall be capable of being monitored and the camera view shall make it possible for the TMC operator to determine lane closures, when they occur. The area of freeway that shall be able to be monitored by this camera shall include the following sections of roadway:

- I-71 from 5th Ave to Spring St
- I-670 from Cleveland Ave to Joyce Ave/Champion Ave
- Following ramps:
  - E I-670 to N I-71
  - W I-670 to N I-71
  - S I-71 to E I-670
  - S I-71 to W I-670

The DBT shall supply three (3) new lowering devices (ie. Winches), to the ODOT D6 ITS ENGINEER, used to lower the camera where applicable. These lowering devices shall be included in the bid price for the pole.

**15.4.9.1 Design**

Where the DBT chooses to use a steel pole to fulfill design views, all requirements regarding steel poles in Sections 15.4.9.1 through 15.4.9.10 shall be followed. The CCTV pole shall be designed by the manufacturer in accordance with the 2004 AASHTO "Standard Specifications for Structural Supports for
Highway Signs, Luminaires and Traffic Signals." All types of poles shall have a maximum one (1) inch deflection in a 30 MPH sustained wind load with seventy-five (75) pounds of weight attached at the top of the pole. Calculations and detailed drawings shall be submitted demonstrating compliance with the AASHTO specification.

15.4.9.2 Materials
The CCTV pole materials shall be certified under Category I, "Conventional Steel Structures" as set forth by the American Institute of Steel Construction Quality Certification Program. Proof of this certification shall be required prior to bid opening to ensure that the fabricator has the personnel, organization, experience, procedures, knowledge, equipment, capability and commitment to fabricate quality pole structures.

All materials and products shall be manufactured in the United States of America, and comply with ASTM or AASHTO specifications. Mill certifications shall be supplied as proof of compliance with the specifications.

15.4.9.3 Welding
All welding shall be in accordance with Sections 1 through 8 of the American Welding Society (AWS) D1.1 Structural Welding Code. Tackers and welders shall be qualified in accordance with the code. Tube longitudinal seam welds shall be free of cracks and excessive undercut, performed with automatic processes, and be visually inspected. Longitudinal welds suspected to contain defects shall be magnetic particle inspected. All circumferential butt-welded pole and arm splices shall be ultrasonically or radio graphically inspected.

15.4.9.4 Performance Calculations
The CCTV pole shall be designed to support the specified camera and accessories. The CCTV poles shall be equipped with camera lowering system. Close consideration must be given to the effective projected area of the complete lowering system and camera equipment to be mounted on the pole along with the weight when designing the pole to meet the specified deflection performance criteria. The pole top deflection shall not exceed one inch in a 30-mph (non-gust) wind. The calculations shall include a pole, base plate, and anchor bolt analysis. The pole calculations shall be analyzed at the pole base, at 5-ft. pole intervals/segments and at any other critical pole section. At each of these locations, the following information shall be given:

- The pole's diameter, thickness, section modulus, moment of inertia, and cross sectional area.
- The centroid, weight, projected area, drag coefficient, velocity pressure, and wind force of each pole segment.
- The axial force, shear force, primary moment, total moment, axial stress, bending stress, allowable axial stress, allowable bending stress, and combined stress ratio (CSR).
- The pole's angular and linear deflection.
15.4.9.5 Pole Shaft
The CCTV pole shaft shall conform to ASTM A595 Grade A with a minimum yield strength of 55 ksi or ASTM A572 with a minimum yield strength of 65 ksi. The shaft shall be hot dip galvanized per the requirements of the contract documents. The pole shaft shall be designed to ensure that the combined stress ratio above the first field joint is greater than the combined stress ratio at the base of the pole, so that the location of failure shall be between the first and second sections of the shaft.

15.4.9.6 Hand Holes
The hand hole opening shall be reinforced with a minimum 2-inch wide hot rolled steel rim. The nominal outside dimension is 6 inches x 27 inches. The handhole shall have a tapped hole for mounting the portable winch thereto as shown on the drawings.

15.4.9.7 Pole Top Tenon
The pole shall have a custom plate mounted tenon that allows the field modification of the arm/camera orientation up to 360 degrees. With this design the Department’s ENGINEER can make slight orientation modifications to the camera mount to allow optimum viewing in case of future road development, change in terrain or a change in the viewing needs priority. The tenon shall have mounting holes and slot as required for the mounting of the camera-lowering system. The tenon shall be of dimensions necessary to facilitate camera lowering device component installation. Each slot shall be parallel to the pole centerline for mounting the lowering device. For details, see applicable drawings.

15.4.9.8 Cable Supports / Electrical Cable Guides and Parking Stand (Eyebolts)
Top and bottom electrical cable guides shall be located within the pole aligned with each other as referenced in the drawings. One cable guide shall be positioned 2 inches below the handhole and the other shall be positioned 1 inch directly below the top of tenon. A parking stand shall be positioned 2.0 inches below the top of the handhole. DBT shall follow manufacturer guidelines for running cable through a 1¼” PVC conduit, secured on the inside of the pole. The 1¼” conduit shall be installed before pole is erected onto its foundation as per manufacturer specs. The only cable permitted to move within the pole or lowering device during lowering or raising shall be the stainless steel lowering cable. All other cables must remain stable and secure during lowering and raising operations.

15.4.9.9 Base Plate
Base plates shall conform to ASTM A36 or A572 Grade 42. Plates shall be integrally welded to the tubes with a telescopic welded joint or a full penetration butt weld with backup bar. Plates shall be hot dip galvanized per the requirements of the contract documents.

15.4.9.10 Anchor Bolts
Anchor bolts shall conform to the requirements of ASTM F1554 Grade 55. The upper 12 inches of the bolts shall be hot dip galvanized per ASTM A153. Each anchor bolt shall be supplied with two hex nuts and two flat washers. The strength of the nuts shall equal or exceed the proof load of the bolts.
15.4.10  632E62820 INTERCONNECT, MISC: VIDEO CODEC (ENCODER/DECODER)

This section describes the specifications for the video encoder to be used in this project. In these Special Provisions, the term Video Encoder describes a CODEC device located in the CCTV Roadside Equipment Cabinet, the term Video Decoder describes the companion device or software located at the TMC, and the term Encoder/Decoder is essentially equivalent to the industry term “CODEC”.

15.4.10.1 General

This item specifies the requirements for the Video Encoder/Decoder. The Video Encoder shall be installed in the CCTV Roadside control cabinet at each camera location, and shall provide communication and video compression capabilities between the Camera Interface and TMC over wireless and optical Ethernet. The TMC is using a RVS10000 Video System Controller and therefore, all camera installations shall be capable of being controlled (Pan, Tilt, Zoom), utilizing the current video system controller.

The DBT shall furnish, install, and test the Video Encoder/Decoder that meets the following requirements:

1. The Video Encoder/Decoder shall be constructed for easy installation in standard, EIA, “19 inch” equipment racks within the CCTV Roadside control cabinet or mounted within the Camera Interface assembly.

2. The Video Encoder/Decoder shall use a MPEG-2/MPEG-4 compression algorithm proven to provide satisfactory operation / performance in a full motion, video application involving surveillance of vehicles at speeds from zero (0) up to one hundred thirty (130) mph.

3. The Video Encoder’s/Decoder’s MPEG-IP compression algorithm when distributed through an IEEE 802.11 Ethernet communications network shall provide image quality near that of the camera’s analog, NTSC video. The DBT shall configure all CCTV sites, which operate on the wireless network to MPEG-1 compression algorithm operating at 1.544 Mbps. CCTV sites on the optical Ethernet network shall be configured for MPEG –2 transmission @ 3mbps. The video compression algorithm shall be tuned to not cause artifacts and distortion (i.e., jumping, blurring, blocking, etc.) when compressing and transmitting full-motion video with a high degree of motion / change between frames and control data over a wireless or wireline channel.

4. Each Video Encoder/Decoder shall incorporate the following:
   - Unicast/Multicast
   - 10/100Base-T Ethernet/IP video
   - Low end-to-end video latency (120 msec)
   - Adjustable H &V resolution and fps and I, B&P frames
   - In-band (RS-232/422/485, 10BaseT) or external control
   - Compliant with Electronic Industries Alliance (EIA) 250C medium haul transmission
• Ruggedized Encoder
• Light Emitting Diode (LED) function array for local remote status and control
• Simple Network Management Protocol (SNMP) network management
• Encoders/Decoders available as plug-in module chassis
• Shall support IP video for distribution to PC workstations via COTS (certified off the shelf) software encoder/decoder

### 15.4.10.2 Standards
National Television Standards Committee (NTSC)

The DBT shall abide by the video telephony standards recommended by the International Telegraph and Telephone Consultative Committee (ITTCC).

### 15.4.10.3 Testing
In addition to the general testing requirements of these Technical Special Provisions, the DBT shall be responsible for all testing and documentation required to establish approval and acceptance of the CODEC products for installation. As a minimum, the following tests shall be conducted:

• Perform field tests with encoder/decoder pairs to verify video quality
• Verify video frame rate (frames per second)
• Verify PTZ data rate (bits per second)

The equipment shall consist of a video signal Encoder and a video signal Decoder, hereafter referred to as CODEC.

The video encoder/decoder shall accept a standard NTSC analog composite video, 1V p-p nominal, 30fps from CCTV camera via coaxial cable and digitize and compress that signal transmission over wireless and optical Ethernet networks. The video encoder/decoder shall receive the digital video stream, decompress and convert to an NTSC analog video signal.

The CODEC shall meet the following specifications:

#### General

• The encoded video signal shall be transmitted over digital network via 10/100Base-T Ethernet interface via RJ-45 connector and UDP protocol supporting IP video destination addressing and CODEC control using TCP/IP. Both unicast & multi-cast transmission must be supported.

• The CODEC must offer the MPEG I/II with I, P, B frames for video compression.

• The CODEC must offer internal settable DIP switches to set default values for video and other parameters upon power-up. The following CODEC video functions must be software configurable remotely through RJ-45/10BaseT and/or up to 4 DB9/RS-422/RS232 interfaces: MPEG I/II, horizontal resolution (720 to 160 pixels), vertical resolution (480 to 112 pixels), the transmission rate from 150 Kbps to 10 Mbps; select 1, 5, 10, 15, 20, 25 or 30 frames per second (fps), a “Bandwidth Cap” configuration that enables the units to adjust automatically
to allow maximum bandwidth utilization, adjust video sizing, input brightness, contrast, sharpness and hue and select between I,P and B frames.

- The CODEC must be able to pass the camera control (PTZ) data through (protocol independent) the Ethernet interface along with the encoded video data. The bit rate must be DIP switch controlled for 9.6 or 19.2 Kbps/300 bps - 38.4 Kbps, settable by software. CODEC encoder/decoder pair shall incorporate standard bi-directional EIA232-E serial port configured as DTE for pan/tilt/zoom data transmission.

- CODEC must offer SNMP Network Management capability.

- The video connectors must be BNC (f) 75 Ω unbalanced.

- In order to maintain real time response of the PTZ camera control on the received video on the monitor, the end-to-end video latency must not exceed 250 milliseconds.

**Physical**

- The transmitter shall be 19” rack mountable in accordance with EIA 310D and shall not exceed external dimensions of 19”W x 1.75”(IU) H x 11.5”D

- The video encoder/decoder pair shall be fully operational with external ambient temperatures ranging from 0°C to 55°C and relative humidity 0-95% non-condensing.

- Alternatively the field encoder shall be ruggedized to accept temperatures ranging from −0 deg to 74 deg C. and not exceed external dimensions of 19”W x 3.50”(2U) H x 11.5D

- Alternatively the Decoders shall be plug-in modules in a chassis and not exceed external dimensions of 19”W x 8.75” (5U) H x 15” D and hold up to 16 decoder modules. (or as accepted by the D6 ITS ENGINEER)

**Electrical**

- The transmitter shall accept NTSC video input signals at 1Vp-p ±0.2 across 75 ohms. Video output shall be 1Vp-p ±0.2 across 75 ohms.

- The transmitters and receivers shall use an input voltage of 115 VAC ±15%, 60 Hz ±5% and shall not exceed a power consumption of 65 watts. An IEC detachable power cord and separate power switch must be provided.

- Each unit must as minimum offer front panel LED indicators denoting: Power On/Off, Link failure, Built-in test failure, and Test or Operational mode.

**Miscellaneous**

*Data Channels:*
Four pass-thru serial data channels between the Encoder and Decoder

Each of the four ports independently settable remotely to be RS232 or RS422, DCE or DTE

Each of the four ports independently settable baud rates of: 38.4K, 19.2K, 9.6K, 4.8K, 2.4K, 1.2K or 300

Connector: RJ 45 or DB9

All transport must be protocol independent and clear channel transmission

*Ethernet Ports:*

Ports: Electrical: 10/100 BaseT, RJ-45

Optical: Single Mode Fiber, SC, Loss Budget: 12 dB conforming to IEEE 802.3, Full or Half Duplex (both ports)

Protocol supported: IP Video, IP Ping, IP/UDP, RTP, SAP

Priority Queuing: Layer 3 QoS

Addressing: DCLHP IP

Mode: Unicast or Multicast

Integral Web server

Management: SNMP and RMON

*Video Encoding:*

Encodes composite video per EIA 170 NTSC, 1.0 +/- 0.2 Vp-p/

75 ohm, and S-Video

Full motion 29.97 fps & 2:1 interlaced, Color and Black & White

MPEG-1 per ISO/IEC 11172-1 AND MPEG-2 per ISO/IEC 13818-1, 2, 3

End-to-End Video Latency 120 millisecond

Adjustability of: Brightness, Contrast, Hue, Sharpness, & Sizing

Adjust H resolution for MPEG-2: 720x480; 640x480; 544x480; 480x480; and 360x480

Adjust H resolution for MPEG 1 & 2: 360x240; 320x240; 160x240; 160x112

Adjust V resolution for MPEG-1 & 2: 1, 5, 10, 15, 25, and 30

Adjust GOP/IPB Structure: I only, IP, IPB, IPBB
Encoder rate: 100 Kbps to 10 Mbps with maximum allowed bandwidth setting

**General:**

Buffered video output available at the encoder for video monitoring while connected with source

Operating temperature: -40 to +74 Deg. C

Size: 19" rack mountable or half 19" rack for pole mounting

Available in plug-in modules in a chassis, minimum 16 modules/chassis

Local control available via craft port on encoder and decoder

Front panel LED's to monitor status and operational modes

MTBF > 80,000 Hours

Internal Dipswitch for all parameters settings

At power up, units to default to dipswitch or software (user-defined)

AC power: 110 +/- 15% Vac, 60 +/- 3 Hz 65 W max

IEC detachable AC power cord and on/off switch

The DBT shall install stand-alone encoders in the field enclosures. The DBT shall install rack-mount encoders and decoders at the TMC. The encoder chassis shall incorporate plug-in modules in a chassis and not exceed external dimensions of 19”W x 8.75” (5U) H x 15” D. The DBT shall install rack mount decoders in the TMC. The decoder racks shall incorporate plug-in modules in a chassis and not exceed external dimensions of 19”W x 8.75” (5U) H x 15” D. The cost of the chassis shall be incidental to the price of the encoder/decoder.

**Video Incident Detection**

All new and existing cameras that fall within the project limits shall be equipped to provide automated traffic video incident detection. The video detection shall be capable of automatically detecting abnormal traffic situations, as selected by the ODOT D6 ITS ENGINEER including, but not limited to:

- Stopped Vehicles
- Wrong-way drivers
- Service Levels
- Slowed Traffic
- Sudden drops in traffic speed
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- Pedestrians
- Debris in the Roadway
- Video Detection Specifications
  - Compatible with IP (MPEG-2, MPEG-4, and H.264) and analog CCTV video feeds (Color and B&W)
  - Capable of clearly detecting incidents in both day and night
  - Capable of clearly detecting incidents in all weather conditions
  - Capable of remote setup through Ethernet communications
  - Capable of being remotely located in the roadside camera cabinet

The automated incident detection shall be configured in a preset view that captures the most freeway viewing area, as determined by the ODOT D6 ITS ENGINEERs. When an incident is detected, the incident shall be identified on the camera image and an alarm shall be presented to the TMC video switch. The TMC video switch shall be configured to send the camera image to specified camera outputs. A list of outputs shall be provided by the ODOT D6 ITS ENGINEERs during installation and configuration. The camera shall be capable of PTZ control and after a certain time period, determined by the ODOT D6 ITS ENGINEER, return automatically to the configured preset view and automatically begin monitoring for additional incidents. All training shall be provided to the ODOT D6 ITS ENGINEERs involving installation and configuration of the Video Incident Detection operation.

15.4.11 FIELD EQUIPMENT CABINET, POLE-MOUNTED

ITEM 633E39010 CABINET WITHOUT CONTROLLER, AS PER PLAN

15.4.11.1 Description
DBT shall furnish and install pole mounted TYPE 336 or equivalent cabinet and rack frame assembly at CCTV sites. The pole mounted Cabinets shall be mounted by attachment to the CCTV poles. Pole mounted controller cabinets shall be mounted at a height, which will allow convenient access to all controller components by service personnel.

Field connection shall be made for the conductors of signal cable, power cable, interconnect cable and wireless cable. Conductors shall be connected so the outgoing circuits shall be of the same polarity as the line side of the power supply. The circuit common return shall be of the same polarity as the ground side of the power supply. The grounded side of the power supply shall be grounded to the cabinet in an approved manner. All field wiring shall be neatly arranged and routed to the appropriate terminal blocks. Field wiring shall be identified in accordance with CMS 632.05, TRAFFIC SIGNAL EQUIPMENT -
GENERAL. Cabinets shall be wired for power so that there are a minimum of four (4) 5-15 outlets, two of which shall be GFCI protected.

Field wiring entering the cabinet except power wiring shall be fitted with spade terminals to assure a good connection. Incoming power wiring may use space terminals; or the bare conductor wire may be connected to terminal points utilizing screw or spring applied clamping surfaces compatible with either copper or aluminum wire and providing a positive grip. After completion of field wiring, the conduit entering the cabinet shall be completely sealed in an approved manner with a removable sealing compound or a molded plastic or rubber device, which is compatible with the cable jacket, the insulation and the conduit material.

Additional Cabinet Power Surge Suppression

In addition to the surge suppression provided on the incoming power to the cabinet, Surge Suppression shall be installed, in order to provide protected power outlets to all devices placed in the cabinet. This surge suppression shall be capable of being plugged into a standard 5-15 outlet. This device shall meet the following minimum specifications:

- 9 NEMA 5-15 outlets
- Shall mount in a standard 19” rack
- Energy Handling – 1280 Joules
- UL 1499 let through rating – 400 Volts
- Surge Current Rating – 50,000 Amps
- Output Current – 15 A

Payment for the additional power surge suppression shall be included in the bid price for the cabinet.

15.5 Pavement Markings and Delineation

Pavement markings and delineation shall include their design and installation on interstate routes, ramps, city streets and underpasses.

15.5.1 Pavement Marking and Delineation Requirements

Pavement marking and delineations shall be in conformance with the TEM Part 3, CMS Items 620, 621, 626, 640, 720, 721 and 740, SCDs, the OMUTCD, and City of Columbus standards. Where pavement markings are optional in these manuals, they shall be provided. Pavement markings and delineations to be provided may include:

A. Edge lines
B. Lane lines
C. Center lines
D. Channelizing lines
E. Stop lines
F. Crosswalk lines
G. Transverse lines
H. Island markings
I. Handicap symbol markings
J. Railroad symbol markings
K. School symbol markings  
L. Parking lot stall markings  
M. Lane arrows  
N. Words on pavement  
O. Dotted lines  
P. Raised pavement markers (RPM)  
Q. Delineators and delineator posts  
R. Barrier reflectors  
S. Islands  
T. Object markers  
U. Barricades and channelizing devices

15.5.2 Pavement Marking and Delineation Design

15.5.2.1 General

Raised pavement markers shall be placed on all streets and highways within the project.

Variable spacing for transverse lines shall be provided in accordance with the TEM.

Barrier reflectors shall be new and conform to CMS Item 626, SCDs and the TEM. They shall be placed on bridge parapets, concrete barrier walls, retaining walls and guardrails in accordance with current design standards. Guardrail blockout reflectors shall be installed on the side of the blockout away from traffic.

Object markers shall conform to CMS Item 630, Sign, Flat Sheet Type G.

Turn lane storage lengths shall be based on L&D standards for final build traffic conditions.

Appropriate pavement markings and delineation on bicycle facilities shall be included according to City of Columbus standards included in the appendices.

15.5.2.2 Mainline and Ramps (ODOT)

All pavement markings on asphalt surfaces shall be Item 644 Thermoplastic.

All pavement markings on concrete surfaces shall be Item 646 Epoxy.

Pavement marking widths shall conform to ODOT CMS Section 641.08 except lane line markings shall be 6” wide.

Snowplowable raised pavement markers shall be new and conform to CMS Item 621. Raised pavement markers shall be used only to supplement pavement markings, not as a substitute. Color, type and spacing shall be in accordance with the CMS and SCDs.

15.5.2.3 City Streets (City of Columbus)

All pavement markings on asphalt surfaces shall be Item 644 Thermoplastic.

For concrete surfaces, a milling/grinding process shall be used with a preformed pavement marking being inset in the recessed area that was milled. See Specifications included in Appendix TC-27.
Pavement marking widths shall conform to Columbus CMS Section 641.08.

Crosswalk layout and widths shall be coordinated with the curb ramp design and follow the criteria established in Section 10.5.2. Marked crosswalks shall be provided as follows:

A. Cleveland Avenue at Jack Gibbs Boulevard – North and East legs
   NO PEDESTRIAN CROSSING (R9-3a) signs shall be installed to prohibit crossing on the south leg of this intersection.

B. Cleveland Avenue at I-670 Eastbound Off Ramps – North, East and West legs
   NO PEDESTRIAN CROSSING (R9-3a) signs shall be installed to prohibit crossing on the south leg of this intersection.

C. I-71 SB Ramp & Lester Drive at Spring Street – North, South, and West legs

D. Elijah Pierce Avenue at Spring Street – North, South, and East legs

E. Lester Drive at Long Street – North and East legs

F. Elijah Pierce Avenue at Long Street – North, East and West legs

G. Cleveland Avenue at Jefferson – East and South legs
   NO PEDESTRIAN CROSSING (R9-3a) signs shall be installed to prohibit crossing on the north leg of this intersection.

H. Cleveland Avenue at Grove Street – West leg
   NO PEDESTRIAN CROSSING (R9-3a) signs shall be installed to prohibit crossing on the south leg of this intersection.

I. Cleveland Avenue at Edward Street – East leg
   NO PEDESTRIAN CROSSING (R9-3a) signs shall be installed to prohibit crossing on the north and south legs of this intersection.

J. Cleveland Avenue at McCoy Street – West leg
   NO PEDESTRIAN CROSSING (R9-3a) signs shall be installed to prohibit crossing on the south leg of this intersection.

The DBT shall provide appropriate turn arrows on all dedicated turning lanes at all intersections. Each lane to which the above applies shall be treated with auxiliary pavement markings according to the City of Columbus Turn Lane Elements as specified in the City of Columbus Pavement Marking Standards document included in Appendix TC-26.

Arrows shall be provided for two-way left turn lanes. Two-way left turn lane arrows shall be placed 16 ft apart (tip to tip).

Snowplowable raised pavement markers shall be new and conform to ODOT CMS Item 621. Raised pavement markers shall be used only to supplement pavement markings, not as a substitute. Color, type and spacing shall be in accordance with the drawings included in Appendix TC-28.

Appropriate pavement markings and delineation on bicycle facilities shall be included according to City of Columbus standards. See City of Columbus Pavement Marking Standards in Appendix TC-26 which includes Bike Lane Marking Standards with marked up revisions.

Any bike lane symbol markings and “TYPE 2” (ladder) markings are to be in a heat-fused preformed thermoplastic pavement marking that shall comply with Item 647 and Item 740, Section 740.08 of the
current edition of the ODOT Construction and Materials Specifications for Type-A90, 90 mil thickness (2.29mm) or Type-B90, 90 mil thickness (2.29mm) material. Additionally, the material shall be a High-Skid Resistant material. The surface of the material must provide a minimum resistance value of 50 BPN (British Pendulum Number), as tested by the British Portable Skid Tester, in accordance with ASTM E303. The material shall also be installed per manufacturer recommendations that may include a primer or adhesive.

15.6 Lighting

The DBT shall provide highway (ODOT) and street (City of Columbus) lighting for all roadways within the project limits for new and reconstructed local roads as well as the interstate system. Roadway lighting for the interstate mainlines and ramps shall conform to the requirements and guidelines for ODOT roadways.

Street lighting for the City of Columbus shall be provided in accordance with City of Columbus Construction & Material Specifications, Section 1000 (Street Lighting) and City of Columbus Street Lighting Material and Installation Specifications (MIS). Street lighting on City of Columbus roadways shall be separate from the ODOT system.

The DBT shall coordinate lighting plan design and construction with ODOT and AEP/DOPW(P).

The DBT shall confirm the photometrics to be used using the analysis method defined in the TEM. The DBT shall use standard ODOT and City of Columbus fixtures, as appropriate. As per TEM 1141-4.2, the illumination design prepared by the DBT shall include a separate analysis for each of three (3) luminaire manufacturers obtained from the ODOT Office of Traffic Engineering. The photometric analysis shall be completed by the DBT and submitted to the IQF for approval, in accordance with Section 2.

If light poles on a structure are not located on piers, the poles shall be installed in a manner that can accommodate structurally-induced vibration. The DBT shall submit a dampening design plan to the Department for approval.

Underpass lighting is for the roadway passing beneath. The agency that maintains the roadway passing beneath is responsible for the underpass lighting including all lighting units, power/circuitry, and subsequent maintenance.

15.6.1 Points of Contact for Street Lighting

Points of contact for coordination of highway and street lighting power sources are:

American Electric Power (AEP) – Freeway Lighting
Greg Zorich
(614) 883-7935
glzorich@aep.com

City of Columbus Division of Power and Water (Power) – Freeway Lighting
Dan Pullen
15.6.2 Highways and Streets to Be Lighted
The DBT shall provide highway lighting for the interstate mainlines and ramps within the project limits as indicated:

A. I-71 from just south of Long Street to just south of the I-670 W/B mainline
B. I-670 from just west of Cleveland Avenue to just east of St. Clair Avenue
C. All I-71 and I-670 ramps within the project limits

The DBT shall provide street lighting along the following roadways and underpasses within the city street grid, as indicated:

A. Long Street from Willow Street to just west of Hamilton Avenue
B. Spring Street from Willow Alley to Alley west of Hamilton Avenue
C. S/B Urban Corridor Street from Spring Street to Long Street
D. N/B Urban Corridor Street from Long Street to Spring Street
E. Cleveland Avenue from Edward Street to Jack Gibbs Blvd. (includes underpass lighting under I-670)
F. Jack Gibbs Blvd. from Cleveland Ave to parking lot driveway on south side

15.6.3 Highway Lighting Standards – ODOT Facilities
Lighting and installation on all ODOT facilities (interstate mainline, ramps and bridges) shall comply with ODOT standards. For all ODOT roadway lighting, the DBT shall furnish and install the light poles, luminaires, foundations, conduit, cables, and all other necessary equipment for the highway lighting systems. All lighting materials and equipment shall be new except that existing power service locations may be reused. In addition, light towers, and high mast luminaires may be reused at their existing locations if they were considered and documented to work with the context of the photometric analysis, or they may be removed and reused at new locations as appropriate. High mast luminaires removed and reused shall be cleaned and relamped. The existing lighting equipment (luminaires, supports, pull boxes, cable, etc.) no longer in service shall be removed and disposed of by the DBT.

The following plans contain information which may be helpful in establishing existing light pole locations and circuitry and are available electronically from ODOT District 6:

FRA – 70-13.44, -71-16.83 (Part I),-670-4.40
FRA – 670-4.36 (3.93 V)
FRA – 670-4.91 (3.93 U)
FRA – 670-5.19 (3.93 R)

Roadways within the project limits which are currently lighted by towers (I-670 from Cleveland Avenue on the west to the eastern project limit, and I-71 from just north of Spring Street to the northern project
limit) shall continue to utilize tower lighting. Conventional and/or low mast units shall be utilized along
the remaining southern portion of I-71. Refer to Section 14.4 for additional design information. City of
Columbus streets shall be lighted as described in Sections 15.6.4, 15.6.5, 15.6.6, and 15.6.7.

400W high pressure sodium (hps) luminaires shall be used for high mast and low mast lighting.

200W and/or 310W hps luminaires shall be used for conventional lighting of ODOT facilities.

High mast tower height shall be nominally 100 feet above adjacent roadway pavement.

Existing tower maintenance platforms not disturbed may remain on this project. Platforms shall not be
installed for new or disturbed locations.

All light poles used for illumination shall be ODOT standard poles of either natural finish aluminum or
natural finish galvanized steel.

The roadway lighting under the Long Street and Spring Street capped areas, under the N/B urban corridor
street between Long Street and Spring Street and in any covered structure shall comply with IESNA RP-
22-05.

Daytime and nighttime lighting for the named locations per RP-22-05 shall be provided. The daytime
lighting shall be divided into four banks of luminaires operated in alternate to equalize burn time on the
lamps and arranged to provide four steps of daytime lighting. Luminaires for nighttime lighting shall be
separate from those for daytime. The ambient level at which switching occurs between each of the
resultant five artificial lighting levels shall be field adjustable to limit the daytime lighting to that
commensurate with the ambient level while preventing short time transient changes in the ambient level
from changing the amount of artificial light provided. Luminaires shall be mounted along and at the top
of both walls for maintenance reasons. The DBT shall provide the Department with detailed
documentation of the circuitry, photo-electric controls, and control center wiring and operation.

Power for ODOT street lighting shall be 240/480 volt, single phase, 3-wire, grounded neutral. Roadway
lighting of ODOT facilities shall be separately metered. Meter locations shall be coordinated with the
Department. The DBT shall supply all materials and labor for power source tie-ins except for final splice.
The final splice shall be performed by the power company.

Where existing ODOT 2-wire circuits will be disturbed and the existing power service is within the
project limits, the DBT shall convert all circuits to 3-wire circuits including any circuits (or portions
 thereof) extending beyond the project limits. Where an existing power service is outside the project limits,
the DBT shall remove any 2-wire circuits (or portions thereof) extending into the project limits which will
be disturbed allowing the existing 2-wire circuitry beyond the project limits to remain.

The DBT shall prepare and submit a detailed structure grounding plan for each structure to the
Department for approval. The grounding plan shall include grounding of all metal items and
appurtenances on all structures, including any and all decorative items. The grounding system shall
include redundancy. At a minimum, the grounding plan shall include items to be grounded, laterals, and
jumpers. The grounding plan shall be prepared in accordance with SCD HL-50.21, with additional
information as needed to provide a complete and acceptable grounding plan.
Roadway lighting of ODOT facilities shall not be interrupted. Should temporary lighting be necessary, the DBT shall provide temporary roadway lighting that meets the minimum ODOT lighting standards.

15.6.4 Street Light Standards – City Facilities

Street lighting on all City of Columbus streets and underpasses illuminating city streets shall be coordinated with the Department and City of Columbus DOPW(P).

The DBT shall contact the Department to schedule three working meetings:
One within 30 days of the contract award to review/confirm scope compliance, one prior to purchasing City lighting materials, and one prior to construction.

The DBT is encouraged to contact DOPW(P) during construction to answer any questions which may arise in the field or discuss possible alternate means or methods.

Street lighting components, as with all lighting for the project, shall be fabricated from US Steel, in accordance with Federal requirements. In addition, street lighting components shall comply with the Department’s competitive bidding requirements.

Street lighting on all City of Columbus streets and underpasses illuminating City streets shall comply with City of Columbus Construction and Materials Specifications, (Section 1000) and City of Columbus Street Lighting MIS standards, as provided in Appendix TC-29. City of Columbus makes no distinction between roadway lighting and underpass lighting; see general street lighting standards.

The Design Criteria for illuminating City streets affected by this project shall be as follows:

1. Average maintained horizontal illumination:
   a. 0.9 footcandles for Cleveland Avenue
   b. 1.2 footcandles for Spring Street, Long Street, and urban corridor streets

2. Average to minimum uniformity ratio shall not exceed 3 to 1.

Street light poles, luminaires, foundations, and related lighting items shall be as per the following MIS Standards except that hardware used to make the cable connections described in MIS-41, II(f) and MIS-107, II(d), shall be in accordance with the cable connections on ODOT’s Qualified Product List (QPL), and items removed shall not be delivered to the DOPW(P) warehouse as stated in MIS-46 and MIS-75. Instead, existing poles, arms, and luminaires being permanently removed shall be carefully separated and returned to City of Columbus DOPW(P). The DBT shall notify DOPW(P) and store the materials on site, suitably protected, at a designated location for pick up by DOPW(P) staff within 5 business days of notification by the DBT. The DBT may dispose of materials that are not picked up within the 5-day timeframe. All other equipment and materials that are no longer in service shall be removed and disposed of by the DBT.

- Long Street and Spring Street: MIS-4, 14, 16, 17/63, 23, 25, 25(modified for bridge use), 41, 75, 142, and 153.
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- Cleveland Avenue widening south of I-670: MIS-4, 14, 15, 16, 17/63, 41, 44, 46, 161, 165, and 172.
- Cleveland Avenue under I-670 bridge: MIS-4, 14, 16, 17/63, 75, and 179.
- Jack Gibbs Blvd. widening east of Cleveland Ave.: MIS-4, 14, 15, 16, 17, 23, 41, 75, 81, & 107.

In addition, compliance with MIS-95 (safety policies) is required.

Power for City of Columbus street lighting shall be 480V, two-wire, grounded.

For all street lighting with power that will be provided by DOPW(P), the DBT shall furnish and install the light poles, luminaires, foundations, conduit, cables, and all other necessary equipment for the street lighting systems. The DBT shall supply all materials and labor for power source tie-ins except for final splice. The final splice shall be performed by the power company.

All lighting materials and equipment shall be new except that the four (4) light poles and luminaires on the south side of Jack Gibbs Blvd. shall be removed and relocated laterally in conjunction with the street widening.

The DBT shall reference the following City street lighting circuit maps (see Appendix TC-30) and tie-in new lights to the existing metered City circuits noted below:

- Long Street – See maps #3 and #14, circuit #34
- Spring Street – See map #3, circuit #242
- N/B & S/B Urban Corridor Streets – See map #3, circuit #242
- Cleveland Avenue south of I-670 – See map #3, circuit #92
- Cleveland Avenue under I-670 Bridge – See map #3, circuit #47
- Jack Gibbs Blvd. east of Cleveland Ave. – See map #3, circuit #417

Street lighting of City of Columbus facilities shall not be interrupted. Should temporary street lighting be necessary, the DBT shall provide temporary street lighting that meets the minimum City of Columbus lighting standards. Wood poles may be used for temporary street lighting. Should temporary street lighting be necessary, the DBT shall provide the lighting system and the power company will provide the connection to the power service.

Minimum vertical clearance of 17 ft from ground surface to aerial lines shall be provided.

The DBT shall maintain existing service for Cleveland Avenue street lighting under the I-670 overpass.

Outages:
The DBT shall correct as quickly as possible all outages or malfunctions. He shall provide the Engineer with addresses and phone numbers where his maintenance forces can be contacted. The DBT shall provide one or more persons to receive all calls and dispatch the necessary maintenance forces to correct outages. Such a person or persons may be used to perform other duties as long as prompt attention is given to these calls and a person is readily available continuously 24 hours a day, 7 days a week. All lamp outages, cable outages, electrical failures and equipment malfunctions shall be corrected to the satisfaction of the Engineer and back to service within five days for a single luminaire and 24 hours for an entire circuit after the DBT has been notified of the outage.
If poles and/or control equipment are damaged and must be replaced, the DBT shall make temporary repairs as necessary to bring the item back into full operation within the allowed period, and shall make permanent repairs or replacement as soon thereafter as possible.

Where the DBT has failed to, or cannot respond to, an outage or equipment malfunction, at these locations within his responsibility, within periods as specified above, the Engineer may invoke the provisions of Section 105.15 and any subsequent billings to the State or the City of Columbus for maintenance services by City forces shall be deducted from monies due or to become due the DBT in accordance with provisions of Section 105.15.

15.6.4.1 Lighting – Long Street and Spring Street Bridges
Street light and pull box locations are shown in Appendix AE-02. The DBT shall provide seals in all raceways on the structures. Sealant shall be applied to raceways in the open ends inside handholes and inside light pole bases for poles on the structure. In light pole bases, sealant shall be applied in addition to the neoprene rubber riser conduit boots specified in the ODOT Standard Construction Drawings. Sealing material shall be placed in accordance with the manufacturer’s printed instructions. Sealant shall be Rainbow Technology Corporation Sealant, RTV Silicone – Clear RTC #88000, Dow Corning 899 Silicone Glazing Sealant – Clear, or approved equal.

15.6.4.1.1 Utility Conduit and Tap Locations
Long Street - The DBT shall reference maps #3 and #14. Existing street lighting circuit #34 shall be connected at a new pull box located at Station 57+03, 28’ right. The pull box shall be located in the existing underground circuit wiring and be extended to new light fixtures installed on the bridge. Conduit with cable shall be installed in the bridge deck to the new pole mounted light fixtures.

Spring Street - The DBT shall reference map #3. Existing street lighting circuit #242 will be extended from the existing pull box at the controller location at Station 52+30, 25’ right. Conduit with cable will be extended on the bridge deck to the new pole mounted light fixtures.

15.6.4.1.2 Voltage Drop and Illumination Calculations
Illumination models and voltage drop calculations for the street lighting on the Spring Street and Long Street bridges and cap are provided in Appendices TC-31 and TC-32. Illumination calculations utilize the City of Columbus standard light fixtures consisting of 150 watt high pressure sodium acorn style luminaires (MIS-142) mounted on 15’ high decorative fiberglass poles (MIS-153) as a basis for design.

15.6.4.1.3 Foundations
The DBT shall be responsible for designing the lighting foundation on the Long Street and Spring Street structures.

15.6.5 Landscape Enhancement Lighting – Spring Street and Long Street Bridges
Landscape enhancement and specialty lighting is specified for both the Spring and Long Street Bridges as referenced in Appendix AE-02.

15.6.5.1 Foundations
The DBT shall be responsible for designing the lighting foundation on the Long Street and Spring Street structures.

15.6.6 Gateway Areas – City Facilities

The existing lighted gateway arch over Long Street between Jefferson Avenue and Willow Street shall not be disturbed.

15.6.7 Combination Signal Supports

Street lighting may be combined with a traffic signal support at the seven (7) signalized intersections being upgraded as part of this project only if the signal support mast arm is located over a street which is being lighted with MIS-172 Downtown poles. If the signal support mast arm is located over Spring Street or Long Street (lighted by MIS-153 post top light poles), a combination signal support shall not be used. Luminaires on combination poles shall be 250 watt, 120 volt as per MIS-185 utilizing a current present detector (MIS-184).
16 Maintenance of Traffic

16.1 General

Maintenance of Traffic (MOT) for this project shall be implemented in a manner that minimizes both construction duration and impact to the traveling public. This section defines specific requirements, restrictions and allowable closure durations for both travel lanes and ramps. Due to the complex nature of this project and the associated MOT issues and concerns, the Design-Build Team (DBT) shall submit a Conceptual MOT Plan prior to initiation of construction. For each buildable unit, the DBT shall submit a Traffic Management Plan (TMP). Complete details regarding these documents are provided in Section 16.3.

The Conceptual MOT Plan must be approved by the Department prior to beginning work.

See Section 1.11 - Construction Noise for a list of noise requirements that the DBT shall comply with.

See Section 1.14 - Governing Regulations for a complete listing of all documents that the project shall comply with.

The DBT shall maintain at least two (2) through lanes in each direction on I-71 throughout the project. The DBT shall maintain at least three (3) through lanes on I-670 Eastbound west of the I-71 southbound exit ramp. At least one lane shall be provided from I-670 Eastbound to I-71 Northbound at all times. Further lane reductions are only allowable during the nighttime and weekend hours indicated in Section 16.7.

Table 16-1 summarizes the allowable closures and restrictions for the roadways in the project area. Complete details of allowable closures and restrictions, including disincentive rates, are provided Sections 16.7, 16.8 and 16.9.

Table 16-1: Summary of Allowable Closures and Restrictions

<table>
<thead>
<tr>
<th>Facility</th>
<th>Allowable Closures/Restrictions (Timeframes indicate cumulative number of days a facility may be closed/restricted)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-71</td>
<td>At least 2 through lanes maintained in each direction. 90-day NB lane closure permitted near I-70.</td>
<td>I-670 Westbound exit/Broad Street entrance ramp system may be utilized for I-71.</td>
</tr>
<tr>
<td>I-670 Eastbound</td>
<td>At least 3 through lanes maintained west of exit ramp to I-71 SB. At least 2 through lanes maintained west of exit ramp to I-71 NB.</td>
<td></td>
</tr>
<tr>
<td>Facility</td>
<td>Allowable Closures/Restrictions</td>
<td>Notes</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>I-670 Spur Eastbound</td>
<td>One lane may be closed anytime except 3:00pm-7:00pm weekdays</td>
<td></td>
</tr>
<tr>
<td>I-71 Northbound Ramps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broad Street ramp to I-71</td>
<td>Connection to I-71 NB shall be closed when traffic would enter I-71 from left under a merge condition and I-71 NB is reduced to less than 3 lanes</td>
<td>Access to Leonard/Fifth Avenue ramp shall be maintained during such a closure.</td>
</tr>
<tr>
<td>NB/I-670 WB</td>
<td>Entire ramp shall be closed when I-71 mainline traffic is using I-670 WB exit/Broad St. entrance ramp system</td>
<td></td>
</tr>
<tr>
<td>Long Street ramp to I-71 NB</td>
<td>Shall be closed when I-71 NB is reduced to two lanes and “add” lane cannot be provided.</td>
<td></td>
</tr>
<tr>
<td>I-71 NB ramp to I-670 EB</td>
<td>May be closed for 60 days</td>
<td>If closure exceeds 120 days, improvements to I-70 WB &amp; SR 315 NB shall be implemented.</td>
</tr>
<tr>
<td>I-71 NB ramp to I-670 WB</td>
<td>May be closed for 365 days</td>
<td></td>
</tr>
<tr>
<td>I-71 Southbound Ramps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-71 SB ramp to I-670</td>
<td>Shall remain open at all times</td>
<td>Lane assignments shall be modified upon closure of Spring Street exit ramp.</td>
</tr>
<tr>
<td>Fifth Ave. ramp to I-71 SB</td>
<td>Shall be closed whenever lane restrictions exist on I-71 SB</td>
<td>Access from Fifth Avenue to I-670 shall be maintained</td>
</tr>
<tr>
<td>I-71 SB ramp to Cleveland/Leonard</td>
<td>To be permanently closed</td>
<td></td>
</tr>
<tr>
<td>I-71 SB ramp to Spring</td>
<td>Existing left-hand ramp to be permanently closed</td>
<td>Traffic shall be detoured to Broad Street until new ramp is open.</td>
</tr>
<tr>
<td>I-71 SB ramp to I-70 EB</td>
<td>Shall remain open at all times, except for a single weekend closure</td>
<td>May be reduced to one lane during overnights and weekends.</td>
</tr>
<tr>
<td>I-71 SB ramp to Broad</td>
<td>May be closed for 14 days</td>
<td>Shall not be closed unless I-71 SB &amp; I-670 WB have ramp access to Spring Street.</td>
</tr>
<tr>
<td>Broad St. ramp to I-71 SB</td>
<td>May be closed during weekends &amp; overnights</td>
<td></td>
</tr>
</tbody>
</table>
### Facility

<table>
<thead>
<tr>
<th>Facility</th>
<th>Allowable Closures/Restrictions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Timeframes indicate cumulative number of days a facility may be closed/restricted)</td>
<td></td>
</tr>
</tbody>
</table>

#### I-670 Eastbound Ramps

<table>
<thead>
<tr>
<th>Facility</th>
<th>Allowable Closures/Restrictions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-670 EB ramp to Cleveland</td>
<td>May be closed for 90 days</td>
<td></td>
</tr>
<tr>
<td>Cleveland ramp to I-670 EB</td>
<td>May be closed for 365 days</td>
<td></td>
</tr>
<tr>
<td>I-670 EB ramp to I-71 SB</td>
<td>May be closed for 60 days</td>
<td>May use either of two ramps to accommodate this movement</td>
</tr>
<tr>
<td>I-670 EB ramp to I-71 NB</td>
<td>Shall remain open at all times</td>
<td>May be reduced to one lane</td>
</tr>
<tr>
<td>I-670 EB ramp to Broad</td>
<td>May be closed</td>
<td>Ramp may be used to accommodate I-670 EB to I-71 SB movement</td>
</tr>
</tbody>
</table>

#### I-670 Westbound Ramps

<table>
<thead>
<tr>
<th>Facility</th>
<th>Allowable Closures/Restrictions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-670 WB ramp to I-71 SB</td>
<td>Shall remain open at all times</td>
<td>May be reduced to one lane</td>
</tr>
<tr>
<td>I-670 WB ramp to Cleveland</td>
<td>May be closed for 60 days</td>
<td></td>
</tr>
<tr>
<td>Jack Gibbs/Cleveland ramp to I-670 WB</td>
<td>May be closed for 90 days.</td>
<td></td>
</tr>
</tbody>
</table>

#### City Streets

<table>
<thead>
<tr>
<th>Facility</th>
<th>Allowable Closures/Restrictions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Street (Jefferson St. to Hamilton Ave.)</td>
<td>May be closed for 180 days</td>
<td>Shall not be closed when Spring Street is closed</td>
</tr>
<tr>
<td>Spring Street (Jefferson St. to Hamilton Ave.)</td>
<td>May be closed for 180 days</td>
<td>Shall not be closed when Long Street is closed</td>
</tr>
<tr>
<td>Cleveland Avenue</td>
<td>Two lanes in each direction shall remain open, except for a 2-week period when 1 lane may be closed in each direction</td>
<td>Coordination with Columbus State schedule and COTA is required</td>
</tr>
<tr>
<td>Jack Gibbs Boulevard</td>
<td>Portion underneath I-71 may be closed for 30 days</td>
<td></td>
</tr>
<tr>
<td>St. Clair Avenue</td>
<td>Two-way, two-lane traffic shall be maintained</td>
<td></td>
</tr>
<tr>
<td>Leonard Avenue</td>
<td>Two-way, two-lane traffic shall be maintained</td>
<td></td>
</tr>
<tr>
<td>Neil Avenue</td>
<td>Shall remain open at all times</td>
<td>Alternate route signage shall be used during I-670 EB lane restrictions</td>
</tr>
</tbody>
</table>

### 16.2 Notification and Coordination

#### 16.2.1 MOT Phase Changes: Notification & Coordination Requirements
At least fourteen (14) days prior to any construction activities, the contractor shall advise the District Office of Communications via email at d06.pio@dot.state.oh.us and the District Work Zone Traffic Manager via email at d06.mot@dot.state.oh.us of the anticipated start date of any construction activities, including but not limited to the placing of work zone signs. The notification shall also include the project number, PID, name and phone number of the contractor, a point of contact and the anticipated impact on traffic. The contractor shall immediately inform the District Office of Communications and the District Work Zone Traffic Manager of any and all delays and/or changes regarding the construction initiation date.

Throughout the duration of the project, the contractor shall notify the project engineer and the others listed in this section in writing of all traffic restrictions and upcoming maintenance of traffic changes. The contractor shall ensure the written notification is submitted in a timely manner to allow the project engineer to meet the required time frames set forth in the table below. This notification shall be received by the project engineer prior to the physical setup of any applicable signs or message boards.

Information shall include but is not limited to all construction activities that impact or interfere with traffic and shall list the specific location, type of work, road status, date and time of restriction, duration of restriction, number of lanes maintained, detour routes if applicable, and any other information requested by the project engineer and the District 6 Communications Office. A summary of the notification time frame requirements for closures and restrictions is provided in Table 16-2.

### Table 16.2: Notification Time Frame Table

<table>
<thead>
<tr>
<th>Item</th>
<th>Duration of Closure</th>
<th>Notification Time Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp and Road Closures</td>
<td>&gt;= 2 weeks</td>
<td>14 business days prior to closure</td>
</tr>
<tr>
<td></td>
<td>&gt; 12 hours and &lt; 2 weeks</td>
<td>7 business days prior to closure</td>
</tr>
<tr>
<td></td>
<td>&lt; 12 hours</td>
<td>2 business days prior to closure</td>
</tr>
<tr>
<td>Lane Closures/Restrictions</td>
<td>&gt;= 2 weeks</td>
<td>7 business days prior to closure</td>
</tr>
<tr>
<td></td>
<td>&lt; 2 weeks</td>
<td>2 business days prior to closure</td>
</tr>
<tr>
<td>All closures/restrictions on Jefferson Avenue</td>
<td></td>
<td>7 business days prior to closure. See Section 7.3 for further details.</td>
</tr>
</tbody>
</table>

Any unforeseen conditions not specified in the plans requiring traffic restrictions shall also be reported to the project engineer, the District 6 Communications Office, and the District Work Zone Traffic Manager using the Notification Time Frame Table.

A pre-maintenance of traffic meeting shall be held (minimum of 10 working days) prior to work beginning or any change of phasing. This meeting shall include the ODOT District 6 Maintenance of Traffic Engineer, the City of Columbus Temporary Traffic Control Coordinator, COTA, as well as the DBT and any sub-contractors involved with temporary traffic control.

When working on city streets and State Routes within the City, City of Columbus Excavation/Occupancy permits shall be obtained from the City of Columbus Transportation Division (614-645-7497) by the contractor at least five (5) days prior to beginning work. A detailed Temporary Traffic Control Plan (TTCP) shall be required as part of the permit process.
16.2.2 Coordination with COTA
The DBT shall coordinate with COTA when any existing bus routes or bus stops will be impacted by lane closures or road closures. The DBT shall strive to minimize disruptions to COTA service. Cleveland Avenue is a critical route for COTA and shall be maintained per Section 16.9.3. At locations where existing bus stops are proposed to remain open within a work zone, the TMP shall document how these bus stops shall be maintained safely and efficiently. The COTA bus stop at the intersection of Cleveland Avenue and Mt. Vernon Avenue shall be maintained at all times.

16.2.3 Points of Contact
City of Columbus, Police Department
Lt. Karl Barth
(614) 645-4844
Kbarth@columbuspolice.org

City of Columbus, Fire Department
Richard Braun
(614) 645-4128
RBraun@columbus.gov

Columbus Public Schools
Steve Simmons
614-365-5074
ssimmons@columbus.k12.oh.us

Columbus State Community College
Paul Goggin, Interim Director, Facilities Services
(614) 287-5060
pgoggin@cscc.edu

Columbus State Community College
John Nestor, Director of Public Safety
(614) 287-2525
jnestor@cscc.edu

Central Ohio Transit Authority (COTA)
Jim Hutcherson
(614) 308-4373
hutchersonjm@cota.com

16.3 Conceptual MOT Plan and Traffic Management Plan
The DBT shall prepare and submit a Conceptual Maintenance of Traffic (MOT) Plan to the Department for approval at least 30 calendar days prior to construction. The Conceptual MOT Plan shall include graphics and text that identifies the following items:
A. Major stages/phases of work
B. The anticipated duration of each major stage/phase  
C. Roadways/ramps that are closed to traffic, and the anticipated duration of the closures  
D. Roadways/ramps that have lane reductions, and the anticipated duration of the lane reductions  
E. Detour routes

For each buildable unit, the DBT shall provide a Traffic Management Plan (TMP) defining and detailing specific MOT plans for each construction phase. The TMP shall be submitted to the Department for approval at least 21 calendar days prior to work on the construction phase. Requirements for a TMP are contained in 23CFR630.1012, published by the Federal Highway Administration (FHWA). The TMP shall consist of a detailed diagrammatic Temporary Traffic Control Plan (TTCP), as well as Traffic Operations (TO) and Public Information (PI) components.

The MOT requirements, listed below, shall be incorporated into the TMP.

A. Cover page/title sheet sealed by an Ohio registered professional engineer  
B. Public Involvement Plan (PIP) sections relevant to the TMP  
C. Contact information included in Section 16.2 – Notification and Coordination, plus any additional contacts as deemed necessary by the DBT or the Engineer  
D. A schedule showing MOT phases and durations. All long-term (as defined in TEM 606-3) lane closures and lane restrictions shall be included and identified. All complete directional roadway closures shall also be identified.  
E. Discussion of sequence of operations and MOT procedures  
F. Plans at 40-scale showing:
   a. The work area  
   b. Begin/end tapers  
   c. Work in vicinity of entrance ramps, as per TEM 607-13 and TEM 607-15  
   d. Temporary pavements and/or structures  
   e. Location of signs (existing, proposed, covered, and modified)  
   f. Locations of typical sections  
   g. Plan Insert Sheets (PIS), including contractor ingress/egress locations  
   h. Plan Notes  
   i. References to applicable SCD’s  
G. Plans at an appropriate scale showing:
   a. Detailed detour plans, incorporating detour routes and alternatives specified in Sections 16.7, 16.8, and 16.9  
   b. PCMS locations  
H. Typical sections showing lane widths, pavements markings, drums, portable concrete barrier (PCB), limiting stations, work area, drop-offs, etc.  
I. Sign details for proposed signs and overlays/modifications of existing signs  
J. Haul routes

Any changes to or modifications of the conceptual MOT plan or TMP shall be submitted to the Department for approval a minimum of 14 calendar days prior to desired implementation of the proposed change(s).
A conceptual MOT phasing scheme has been prepared by the Department and is included as Appendix MT-01. This phasing is a preliminary concept that shows the southern terminus of the I-71 work at Spring Street, instead of the current terminus near Long Street. This conceptual phasing is provided to the DBT for informational purposes only. The DBT may or may not elect to utilize any or all elements of this phasing scheme into the TMP. It is the responsibility of the DBT to ensure that any phasing strategy carried forth into the TMP is compliant with all requirements specified in this scope document, particularly in relation to allowable closures and closure durations. The Department does not assume responsibility that the above referenced phasing scheme is in compliance with this scope document.

16.4 Maintenance of Traffic Requirements

16.4.1 General MOT Requirements
All MOT components proposed by the DBT shall comply with the applicable Governing Requirements documents contained in Section 1.14. Any and all costs associated with components that do not comply shall be borne by the DBT.

The DBT shall provide, erect, and maintain drums, signs, barriers, and other traffic control devices used for maintenance of traffic in acceptable condition, in accordance with ODOT’s Quality Guidelines for Temporary Traffic Control Devices.

The DBT shall utilize drums at all times (cones not allowed) as channelizing devices on all roadways. Device spacing shall be a maximum of 40 feet center-to-center in tapers and 80 feet center-to-center in tangent sections on freeways and ramps. On city streets, device spacing shall be a maximum of 20 feet center-to-center in tapers, 40 feet center-to-center in tangent sections, and 6 feet center-to-center in radii.

Along with modifications to existing freeway signing, the DBT shall modify existing attractions signing to reroute traffic during closures of exit ramps. All existing freeway directional signs for attractions (i.e. Greater Columbus Convention Center, Nationwide Arena, Columbus State Community College, Statehouse, and COSI) shall be modified to direct traffic to appropriate detour routes. City street signs for these attractions, or any other signed attraction, shall be modified to direct traffic to appropriate detour routes. Additional signage shall be erected to maintain proper routing to these attractions.

For the purpose of this project, “Moving Operation” shall be limited to pavement marking striping.

16.4.2 Maintaining Access
The DBT shall maintain local vehicular and pedestrian access to all affected properties.

16.4.3 Construction Traffic & Equipment
Construction vehicles used by the DBT and truck traffic required by the DBT shall comply with any and all load restrictions and vehicle delineation requirements.

The TMP shall identify haul roads for use during construction. Haul roads may include the State Route System and all streets being worked on within the project limits. All other haul roads shall be pre-approved by the Engineer.
As per CMS 614.03, contractor equipment and materials shall always be stored in locations that do not pose a safety risk to the traveling public. Construction equipment shall be stored either behind barriers or outside of the clear zone. Construction equipment shall be stored outside of sidewalks and bike lanes/paths that are open to traffic.

16.4.4 **Entering and Exiting the Work Zone**
All vehicles entering the work zone from the freeway or departing the work zone onto the freeway shall use designated locations which have been designed as per Plan Insert Sheet 209563 “Construction Access Points”.

16.4.5 **PCMS**
The DBT shall provide, install, and maintain Portable Changeable Message Signs (PCMS) for use during construction. Class A PCMS shall be used on freeways, while Class B PCMS shall be used on city streets. The Class A and Class B signs shall be on the Department’s approval list at [http://www.dot.state.oh.us/divisions/constructionmgt/materials/pages/portable-changeable.aspx](http://www.dot.state.oh.us/divisions/constructionmgt/materials/pages/portable-changeable.aspx). Class A PCMS shall be utilized at the locations and scenarios specified in Table 16-3. All messages shall be approved by the Engineer prior to display on PCMS. Placement and relocation of the signs shall be in accordance with the TEM, OMUTCD, or as directed by the Engineer in the field. The Engineer has the authority to modify these locations as needed. PCMS used for advance notification of a closure shall be placed and operating 6 days prior to the closure.

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>REQUIRED SCENARIOS FOR PCMS (CLASS A) USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-70 Eastbound west of I-670</td>
<td>I-670 Eastbound freeway closure (SD, OV, WKD)</td>
</tr>
</tbody>
</table>
| SR 315 Southbound north of I-670 | I-670 Eastbound freeway closure (SD, OV, WKD)  
Closure of I-670 EB ramp to I-71 SB (OV, WKD)  
Closure of I-71 SB ramp to I-70 EB (WKD**) |
| SR 315 Northbound south of I-670 | I-670 Eastbound freeway closure (SD, OV, WKD)  
I-71 Northbound freeway closure (OV, WKD) |
| I-670 Eastbound west of project limits | I-670 Eastbound freeway closure (SD, OV, WKD, ADV)  
Closure of I-670 EB ramp to Cleveland Avenue (SD, OV, WKD, ADV)  
Closure of I-670 EB ramp to I-71 SB (SD, OV, WKD, ADV)  
Closure of I-71 SB ramp to I-70 EB (WKD**)  
Major traffic pattern shifts |
| I-71 Northbound south of I-70 | I-670 Eastbound freeway closure (SD, OV, WKD)  
I-71 Northbound freeway closure (SD, OV, WKD)  
Closure of I-71 NB ramp to I-670 EB (SD, OV, WKD) |
| I-70 Eastbound west of SR 315 | I-670 Eastbound freeway closure (SD, OV, WKD)  
I-71 Northbound freeway closure (SD, OV, WKD) |
| I-70 Westbound east of I-71 | I-71 Northbound freeway closure (SD, OV, WKD)  
Closure of I-71 NB ramp to I-670 WB (SD, OV, WKD) |
I-71 Northbound south of project limits
Closure of I-71 NB ramp to I-670 EB (ADV, SD, OV, WKD)
Closure of I-71 NB ramp to I-670 WB (ADV, SD, OV, WKD)
Major traffic pattern shifts

I-71 Southbound north of I-670
Major traffic pattern shifts
I-71 Southbound freeway closure (SD, WKD*, ADV)
Closure of I-71 SB exit ramps (WKD**, ADV)

I-670 Westbound east of I-71
Closure of I-670 WB ramp to Jack Gibbs Blvd. (ADV, SD, OV, WKD)

*Weekend closures of I-71 Southbound are only allowed for removing indigestible boulders related to microtunneling, as detailed in Section 16.7.3.2
**A single weekend closure of the I-71 SB ramp to I-70 EB is permitted, as per Section 16.8.2.5

Class A PCMS shall also be used as per Plan Insert Sheet (PIS) 209960 at the location of short-duration freeway closures and short-duration freeway-to-freeway ramp closures.

Class B PCMS shall be used on city streets and ramps to notify traffic of upcoming road and ramp closures.

16.4.6 Advance Work Zone Signing
The DBT shall erect a total of four (4) Advance Work Zone Information Signs on Interstate routes heading into Columbus. These signs shall be placed on the inbound directions of I-70 and I-71 outside of the I-270 Outerbelt. These signs shall only be erected when lanes on I-71 or I-670 are restricted. These Advance Work Zone Information Signs shall be placed in locations away from other guide signs or ramps, so as to make them as prominent to drivers as possible. These signs shall suggest that through truck traffic utilize I-270 as an alternate route. The messages on these Advance Work Zone Information Signs shall read as per the plan shown in Appendix MT-02. The design of the sign shall be as per the plan shown in Appendix MT-02.

16.4.7 Marking and Delineation
In addition to meeting the CMS 614 specifications for work zone pavement markings, work zone pavement markings shall be reapplied at least once per year or as directed by the Engineer. Reapplication of work zone pavement markings shall be performed prior to each over-winter condition.

Barrier reflectors and object markers shall be installed on all portable concrete barrier within the right-of-way in accordance with the alternative delineation method (triple-stacked) shown on Standard Construction Drawing MT-101.70. Barrier reflector and object marker materials and installation shall conform to CMS 626.02 and 626.04.

The DBT shall mill-and-fill any pavement outside of the project limits that has been scarred due to shifting and/or replacement of existing pavement markings. This shall occur when traffic can be moved to its final pattern regardless of completion of the rest of the project. Transition areas inside the project limits shall be resurfaced as per TEM 642-48. Upon completion of work on a roadway, pavement markings in such locations on asphalt surfaces shall be replaced with thermoplastic markings (CMS 644). Markings on concrete surfaces shall be replaced with epoxy markings (CMS 646).

16.4.8 Lighting in Work Zone
The DBT shall be responsible for maintaining lighting on freeways and ramps, as per TEM 1142-35. The DBT shall comply with TEM 640-22 for additional temporary lighting requirements.

On City streets with existing lighting systems, the DBT shall maintain lighting on at least one side of the street at all times, unless the street is closed to all pedestrian and vehicular traffic. Existing, temporary, or proposed lighting systems may be utilized to satisfy lighting requirements.

**16.4.9 Pedestrian/Bike Path Access**

The DBT shall maintain and detour pedestrian traffic on City streets in accordance with TEM 640-25. ADA-compliant pedestrian access shall be maintained at all times on at least one side of any street that is open to vehicular traffic. Any temporary sidewalks shall be asphalt or concrete. The safety of pedestrian traffic along roadways shall be considered at all times. It shall be the contractor’s responsibility to provide lights, signs, temporary fence, barricades, and other devices to warn and physically separate the pedestrians from hazards incidental to the construction. Access to bike paths shall be maintained as per TEM Section 606-11.

**16.4.10 Detour Routes**

The DBT shall maintain detour routes in a condition that is reasonably smooth and free from holes, ruts, ridges, bumps, dust and standing water. Once the detour is removed and traffic returned to its normal pattern, the detour route shall be restored to a condition that is equivalent to that which existed prior to its use for this purpose.

The detour routes listed in Sections 16.7, 16.8, and 16.9 have been approved by the Department. Any modification to these detour routes, or use of other detour routes must be approved by the Department’s Office of Environmental Services – Cultural Resource Section. The Independent Quality Firm (IQF) shall confirm that any comments provided by the Department’s Office of Environmental Services – Cultural Resource Section have been addressed prior to the implementation of any detour routes.

**16.4.11 Mobile Speed Awareness Trailers**

The DBT shall provide two (2) Mobile Speed Awareness Trailers (MSATs) for use in controlling speeds on city streets in and near the project limits. The DBT shall locate the MSATs as directed by the Department. It is anticipated that each MSAT will be used at multiple locations during the project. The MSATs shall be set-up/relocated within two (2) business days upon request from the Department. Each MSAT shall meet the requirements specified in Appendix MT-07. The MSATs shall be maintained as per the relevant portions of TEM 642-41.

The DBT shall maintain copies of all data files collected by the MSATs, for use as requested by the Department.

**16.4.12 Construction Activities near Columbus State Community College**

When performing work in the vicinity of the Columbus State Community College (CSCC) campus, the DBT shall adhere to the provisions of the Contract for Right of Entry (Appendix RW-02) and the
Memorandum of Agreement (Appendix RW-03) with CSCC. See Section 7.3 for details on these requirements.

16.5 Design Criteria

The information listed below is provided for incorporation into the Conceptual MOT Plan and TMP.

A. Design Speed
   1. Interstate = Existing posted speed limit on approaches to the work zone
      Work zone posted speed limit within the work zone

      It should be noted that the existing posted speed limits on I-71 and I-670 eastbound transition from 65mph to 55mph within the work zone. See TEM 640-18 for further details regarding work zone speed limits.
   2. Non-Freeway Roadways = 25 mph & 35 mph, as posted

B. Lane Widths
   1. Interstate = minimum 11-foot width
   2. Ramps = minimum 11-foot width
   3. Other Non-Freeway Roadways = minimum 10-foot width

C. Uncurbed Edge of Pavements
   Any existing, temporary, or proposed edges of pavement shall be a minimum of 2 feet away from the edge of a travel lane and shall meet Standard Construction Drawing MT-101.90.

D. Barriers
   Minimum 1-foot clearance between barrier and edge of travel lane. Portable Concrete Barrier (PCB) on bridge decks shall be installed as per the Bridge Design Data sheet PCB-DD.

E. Crash Compliance
   All work zone traffic control devices shall be compliant with NCHRP 350 requirements.

The DBT shall provide roadway and/or shoulder improvements, including widening or rebuilding to CMS Item 615 temporary pavement standards, at any location necessary to accommodate the TMP. Refer to Section 16.10 – Improvements to Existing Roadway Network for additional information.

All drop-offs in the work zone shall be compliant with Standard Construction Drawing MT-101.90.

The following TEM notes shall apply:
   642-3 Maintaining Traffic At All Times (be specific for each route)
   642-6 Holiday and Special Events (with Thanksgiving modification as per District 6 directive)
   642-8 Notice of Closure Sign
   642-14 Trench for Widening
   642-15 Overnight Trench Closing (no more than 1.5 inches)
   642-17 Drum Requirements
   642-24 Work Zone Speed Limit Sign
   642-27 Work Zone Penalties Sign
642-29 Floodlighting
642-30 Work Zone Impact Attenuator for 24" wide hazards
642-31 Work Zone Impact Attenuator for hazards over 24" wide but less than 36" wide
642-33 Extra Advance Warning Signs (note A)
642-41 Portable Changeable Message Signs, As Per Plan
642-43 Advance Work Zone Information
642-48 Work Zone Raised Pavement Marker
642-49 Work Zone Raised Pavement Markers on Concrete Surfaces
642-51 Concrete Barrier Delineation
642-52 Guardrail Delineation
642-55 Law Enforcement Officer (with Patrol Car) for assistance during construction operations

16.6 Lane Closures

Allowable durations for lane closures, ramp closures, road closures, and related items are defined in Sections 16.7, 16.8, and 16.9. Disincentives shall apply if the DBT exceeds specified allowable timeframes. Disincentives shall apply to exceeding closure durations for both short-term and long-term closures. Incentives shall not be awarded for closure durations less than the specified maximum lengths, except for the Spring Street and Long Street bridges over I-71 (noted in Section 16.9.1 and 16.9.2).

Provision of lane closures by the DBT that violate the Permitted Lane Closure Hours (PLCH) may be rejected before or during construction. All costs associated with any such rejection shall be borne by the DBT. All costs for subsequent closures that violate the PLCH shall be borne by the DBT, both for time and for schedule.

It may be necessary to extend the location of advance warning zones (flashing arrow panels, tapers, buffers, signing, etc.) beyond the minimum distances shown on the standard drawings or plans. This may be due to horizontal or vertical alignments of the roadway, exit or entrance ramp locations or other sight obstructions. Taper lengths and flashing arrow panel (FAP) locations shall meet the minimum standards and shall be placed in tangent sections and shall be approved or adjusted as directed by the Engineer. Additional signing, including YIELD and MERGE signs may be required for ramps within 1000 feet of a work zone.

During freeway lane closures, in addition to the required LEO, the work zone(s) shall utilize a protection vehicle as shown on SCD MT-95.30. The protection vehicle shall be equipped with a truck-mounted attenuator compliant with NCHRP 350 for a speed of 65 miles per hour. Weight and size of the truck shall meet the attenuator manufacturer’s specifications.

16.7 Freeway Closures and Restrictions

16.7.1 Freeway Mainline Operations
Disincentives shall apply if the DBT exceeds the allowable timeframes specified for freeway lane closures. Disincentives shall be applied at a rate of $500 per minute per lane, with a maximum of
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$30,000 per through lane per day, to the DBT for the duration of temporary freeway lane closures that exceed limits set forth in this document.

16.7.1.1 I-71 Mainline
The DBT shall maintain at least two (2) through lanes of I-71 traffic in both the northbound and southbound directions. Through lanes are defined as continuous mainline lanes, and do not include lanes that are either added at entrance ramps or dropped at exit ramps. During certain nighttime hours (see Section 16.7.2), I-71 may be reduced to one (1) lane of traffic in each direction, except during special events and holiday weekends (defined in Section 16.7.3). All entrance ramps on the freeway within the lane closure or merge tapers shall be closed during any periods where only one (1) through lane is open to traffic.

The portion of I-71 northbound between I-70 and the ramp from I-70 westbound (i.e. the I-70 Eastbound “ramp” to I-71 Northbound) may be reduced to one (1) lane for a maximum of 90 days. This lane reduction is only allowable within the first 365 days after the project is awarded. In addition, this portion of I-71 northbound may be reduced to one (1) lane during weekends and overnights, except during special events and holiday weekends, as described in Section 16.7.3. Two lanes must be maintained on this section of I-71 Northbound at all other times. If a lane reduction is implemented, the approach taper for such a lane closure shall begin approximately 500 feet east of Fourth Street (approx. I-70 Sta. 754+00). The lane closure shall extend to at least Oak Street (approx. Sta. 6+00 of East Innerbelt, as per Plan FRA-70-13.44/FRA-71-18.63 Part I/FRA-670-4.40). Disincentives shall be applied at a rate of $5,000 per day for the duration of the closure in excess of the maximum number of days.

During any long-term lane restriction, an advance warning sign shall be placed on I-70 Westbound approaching this area (approx. Sta. 844+00). The message on this sign shall read as per the plan shown in Appendix MT-08. The design of this sign shall read as per the plan shown in Appendix MT-08.

During construction of the microtunnel (described in Section 11.4.5), lane shifts and lane width reductions are permitted on I-71 south of the project limits. Lane widths, shoulder widths, and barrier offsets shall comply with the criteria listed in Section 16.5.

16.7.1.2 I-670 Westbound Exit/Broad Street Entrance Ramp System
The existing I-71 northbound design features a configuration that allows drivers to exit I-71 (on the left-hand side) at the I-670 westbound exit ramp and reenter I-71 (on the left-hand side) using the Broad Street entrance ramp. This unique ramp system may be utilized by the DBT in order to meet the required two open through lanes for I-71. However, the DBT shall adhere to the following stipulations in regards to the I-670 Westbound exit/Broad Street entrance ramp system:

- If two northbound through lanes are being provided on the existing mainline, the left-hand merge onto I-71 shall be closed (due to the short merge length that exists) and detoured as per Section 16.8.1.1. This shall result in no Broad Street access to I-71 northbound.
- If one or more of the required I-71 through lanes are being diverted onto the I-670 Westbound/Broad Street ramp system, the Broad Street entrance ramp shall be closed and detoured as per Section 16.8.1.1. Any I-71 through lanes using the Broad Street left-hand
entrance ramp to I-71 northbound shall return to the mainline alignment as an add lane. The lane(s) may not be merged upon reaching the existing I-71 northbound alignment.

16.7.1.3 I-670 Eastbound Mainline
A minimum of three (3) lanes shall be maintained on I-670 Eastbound at all points west of the exit ramp to I-71 southbound. A minimum of two (2) lanes shall be maintained on I-670 eastbound between the exit ramp to I-71 southbound and the exit ramp to I-71 northbound. A minimum of one (1) lane shall be maintained on I-670 eastbound between the exit ramp to I-71 northbound and the entrance ramp from I-71 northbound. A minimum of two (2) lanes shall be maintained on I-670 eastbound east of the entrance ramp from I-71 northbound. However, additional lane closures are permissible when compliant with the PLCH during nighttime periods, except during holiday weekends and special events (as defined in Section 16.7.3).

16.7.1.4 I-670 Spur Eastbound (Convention Center Connector)
The I-670 Spur Eastbound may be reduced to one (1) lane in the vicinity of the merge with I-670 Eastbound mainline (approx. I-670 WB Sta. 110+00). Two lanes must be maintained on the I-670 Spur Eastbound from 3:00pm through 7:00pm on weekdays. Disincentives shall apply at a rate of $100 per minute for the duration of lane closures occurring during the restricted hours

16.7.2 Definitions of Timeframes
This section defines timeframes pertaining to freeway closures and lane closures.

16.7.2.1 Permitted Lane Closure Hours (PLCH)
Additional temporary reductions in the number of through lanes on I-71 and I-670 may occur as follows:
- From 3 to 2 lanes – 9:00pm – 5:00am
- From 3 to 1 lane – 11:00pm – 5:00am
- From 2 to 1 lane – 11:00pm – 5:00am
Add/drop lanes between interchanges, and exit/entrance ramp lanes are not considered “through” lanes. These additional temporary lane reductions are not permitted during holiday weekends or special events as defined in Section 16.7.2.2.

16.7.2.2 Holiday Weekends and Special Events
Holiday weekends are defined in TEM 642-6. Please note that ODOT District 6 does not permit existing lane closures from 12:00 Noon Tuesday to 6:00AM Monday during the Thanksgiving holiday week. In addition to holiday weekends, freeway closures shall not be permitted during the following special events:
- Ohio State University home football weekend games (10:00pm Friday – 3:00am Sunday)
- Ohio State University home football weeknight games (7:00am before game – 3:00am after game)
- All-American Quarter Horse Congress weekends
- Red, White & Boom fireworks night (12:00 Noon prior to fireworks – 3:00am after fireworks)
- Ohio State Fair
16.7.3 Freeway Closures
Complete closure of the I-71 northbound freeway lanes or I-670 eastbound freeway lanes (not simultaneously) is allowable with a properly signed detour route and only during weekday overnight hours and certain weekends. In addition to the detour signage, PCMS shall be placed as per Section 16.4.5. I-71 Southbound shall not be closed at any time, except for short duration (as defined in ODOT PIS 209960) overnight/weekend closures and emergency closures related to microtunneling as described in Section 11.4.5. Closures are not permitted during special events or holiday weekends, as defined in Section 16.7.2.2. Weekday overnight and weekend closures are defined as:

- Weekday overnight closure: 9:00pm through 5:00am (Sunday-Thursday)
- Weekend closure: 10:00pm (Friday) through 5:00am (Monday)

16.7.3.1 I-71 Northbound Complete Closures
Single-night weekday and weekend closures of I-71 Northbound within the work limits are permitted. Traffic shall be diverted using I-70, SR 315, and I-670. Properly signed detours, including sufficient advance notice, are required.

I-71 Northbound shall not be closed at any time while I-670 Eastbound is closed.

16.7.3.2 I-71 Southbound Complete Closures
Short duration closures, as per ODOT PIS 209960, of I-71 Southbound are permissible during allowable weeknights or weekends as described in 16.7.3.

The only other permitted closures of I-71 Southbound shall be for removing indigestible boulders necessary for the microtunneling construction discussed in Section 11.4.5. If closure of I-71 is necessary to remove boulders, such a closure shall only take place on weekends as described in Section 16.7.3. If the freeway is not fully open to traffic by 5:00am Monday, the disincentive rate for unallowable freeway lane closures shall apply. Traffic shall be detoured via I-670 and SR 315. The DBT shall submit a contingency Traffic Management Plan (TMP) for an unanticipated weekend closure scenario prior to undertaking the microtunneling operation.

16.7.3.3 I-670 Eastbound Complete Closures
Single-night weekday closures and weekend closures of I-670 Eastbound within the work limits are permitted. Traffic shall be diverted using I-70 and I-71. During such a closure, advance warning and detour signs shall be placed on I-70 eastbound west of the I-70/I-670 split in order to divert traffic to I-70 and I-71. Properly signed detours are required.

I-670 Eastbound shall not be closed at any time while I-71 Northbound is closed.

16.8 Ramp Closures and Restrictions
The following lists the allowable closures and restrictions for the freeway ramps in the project area. Ramp closures shall only occur when necessary to complete work, expedite work, or to prevent traffic congestion and/or safety issues. The duration of ramp closures shall be minimized by the DBT. All
closures shall have properly signed detours, unless otherwise noted below. Conceptual detour plans have been provided in Appendix MT-03.

Disincentives shall apply if the DBT exceeds the allowable timeframes for ramp closures specified below. All closure durations listed below represent the maximum cumulative number of days that a ramp may be closed.

16.8.1 I-71 Northbound Ramps

16.8.1.1 Broad Street to I-71 Northbound/I-670 Westbound
The entrance ramp from Broad Street to I-71 Northbound/I-670 Westbound may be closed by the DBT. This entrance ramp shall be closed if mainline I-71 Northbound traffic is diverted onto the I-670 Westbound Exit/Broad Street Entrance ramp system. The connection to I-71 Northbound shall also be closed if a left-hand merge condition exists at I-71 when less than 3 lanes are provided on I-71 Northbound at the merge point. Traffic from the Broad Street entrance ramp shall be diverted to Fourth Street during a closure. (The connection to I-670 Westbound can be maintained, so long as the I-71 Northbound to I-670 Westbound ramp still departs from the left side of I-71.)

16.8.1.2 Long Street to I-71 Northbound
The entrance ramp from Long Street to I-71 Northbound may be closed by the DBT. This ramp currently adds a third lane onto I-71 Northbound. This ramp shall be closed during any construction phase where this third (“add”) lane is not provided on the mainline. Traffic from this ramp shall be diverted to Fourth Street as per the conceptual detour plan provided in Appendix MT-03.

16.8.1.3 I-71 Northbound to I-670 Eastbound
The exit ramp from I-71 Northbound to I-670 Eastbound may be closed by the DBT, with traffic detoured to I-670 via SR 315. This ramp may be closed for a maximum of 60 days during the project. Disincentives shall be applied at a rate of $2,200 per day to the DBT for the duration of the ramp closure exceeding the maximum number of days. The ramp from I-71 Northbound to Leonard Avenue/Fifth Avenue shall be maintained at all times that the I-71 Northbound ramp to I-670 Eastbound is closed.

During any long-term closure of the I-71 Northbound to I-670 Eastbound ramp, the DBT shall provide improvements to the Leonard Avenue/St. Clair Avenue intersection. These improvements are described in Section 16.10.1.

16.8.1.4 I-71 Northbound to I-670 Westbound
The exit ramp from I-71 Northbound to I-670 Westbound may be reduced to 1 lane at any time. Closures of this ramp are also permitted, with traffic detoured via I-70 Westbound and SR 315 Northbound. This ramp may be closed for a maximum of 365 days during the project. Disincentives shall be applied as a rate of $5,000 per day to the DBT for the duration of the ramp closure exceeding the maximum number of days.

If this ramp is closed for more than 120 days, improvements to the detour route (I-70 Westbound and SR 315 Northbound) shall be implemented prior to closure of the ramp. These improvements are described
in Section 16.10.2. If the prescribed improvements in Section 16.10.2 are not constructed, disincentives shall apply at a rate of $30,000 per day for each day in excess of 120 days that this ramp is closed. If this ramp is closed for 120 days or less, the DBT does not need to provide the improvements in Section 16.10.2.

The I-71 Northbound ramp to I-670 Westbound crosses over Cleveland Avenue (west of the entrance ramp from Jack Gibbs Boulevard). When the ramp from Jack Gibbs Boulevard is open, the bridge over Cleveland Avenue shall also be maintained with at least one lane of traffic.

16.8.1.5 I-71 Northbound to Fifth Avenue/Leonard Avenue
The ramp from I-71 Northbound to Fifth Avenue/Leonard Avenue shall remain open at all times when the ramp from I-71 Northbound to I-670 Eastbound is closed. If a closure of this ramp is necessary, traffic shall be detoured via I-670 Eastbound to Leonard Avenue.

16.8.2 I-71 Southbound Ramps

16.8.2.1 I-71 Southbound to I-670
Upon closure of the Spring Street exit ramp, the DBT shall reassign the I-71 Southbound lanes at the I-670 diverge point. The left two lanes shall be assigned to I-71 Southbound, and the right two lanes shall be lane drops to I-670. The two lanes of traffic on I-71 Southbound south of the I-670 diverge shall continue through the work zone. A conceptual diagram of this configuration is provided in the Appendix MT-04. The DBT shall modify and/or realign all necessary overhead signs to show these new lane assignments. The DBT shall also remove and replace any freeway pavement markings that conflict with these new lane assignments.

16.8.2.2 Fifth Avenue to I-71 Southbound
The entrance ramp from Fifth Avenue to I-71 Southbound shall be closed at any time that lane closures exist on I-71 Southbound. Traffic shall be detoured via Summit Street/Third Street to I-670 Eastbound. A conceptual signing diagram for this detour is provided in Appendix MT-03. The ramp from Fifth Avenue to I-670 shall be maintained at all times.

16.8.2.3 I-71 Southbound to Cleveland/Jack Gibbs
The I-71 Southbound exit ramp to Cleveland Avenue/Leonard Avenue shall be permanently closed when the project is complete. This ramp may be closed during the project construction. A detour shall not be signed when this ramp is permanently closed. Prior to permanent closure, Notification of Closure signs shall be erected 14 days in advance. See TEM 605-8.3 for further details. Overhead guide signs on I-71 shall be covered or removed upon closure of this ramp.

16.8.2.4 I-71 Southbound to Spring Street
The existing I-71 Southbound left-hand exit ramp to Spring Street shall be permanently closed when the project is complete. This ramp may be closed during project construction. Traffic shall be detoured to the Broad Street exit ramp. Traffic bound for westbound Spring Street shall be detoured via Broad Street to Washington Street. Traffic bound for eastbound Spring Street shall be detoured via Broad Street, 17th Avenue, Long Street and Hamilton Avenue. The eastbound detour route requires drivers to make an
eastbound left turn from Broad Street onto 17th Street. This movement is currently prohibited. The City of Columbus will modify the Broad/17th signal during this detour to allow this movement. The DBT shall coordinate with the Department to ensure that this intersection is modified prior to the detour implementation.

The DBT shall erect wayfinding signage along the eastbound detour route for the King Arts Complex and the Lincoln Theatre during closure of the Spring Street exit ramp. These wayfinding signs shall contain the logos of these two facilities.

Upon closure of the Spring Street exit ramp, I-71 southbound lanes at I-670 shall be reassigned as discussed in the I-71 Southbound to I-670 section. A drawing of this configuration is shown in Appendix MT-03.

**16.8.2.5 I-71 Southbound to I-70 Eastbound**
The I-71 Southbound exit ramp to I-70 Eastbound may be reduced to one (1) lane during overnights and weekends, except for special events and holidays as defined in Section 16.7.3. A single weekend closure of this ramp is permitted, with traffic detoured to I-670 westbound and SR 315 northbound. Properly signed detours, including sufficient advance notice, are required. Two lanes must be maintained on this ramp at all other times. Disincentives shall be applied at a rate of $100 per lane per minute for the duration of lane closures outside of the allowable timeframes. Lane width and shoulder width reductions are permitted. Lane widths, shoulder widths, and barrier offsets shall comply with the criteria listed in Section 16.5.

**16.8.2.6 I-71 Southbound to Broad Street**
The exit ramp from I-71 Southbound ramp to Broad Street may be closed during construction. During such a closure, traffic shall be detoured via Spring Street and Third Street. This ramp may be closed for a maximum of 14 days during the project, but shall remain open any time that I-71 Southbound and I-670 Westbound do not have ramp access to Spring Street. Disincentives shall be applied at a rate of $2,000 per day for the duration of the ramp closure exceeding the allowable number of days.

**16.8.2.7 Broad Street to I-71 Southbound**
The Broad Street entrance ramp to I-71 Southbound may be closed during weekends and overnights, except for special events and holidays as defined in Section 16.7.3. If such a closure is necessary, eastbound Broad Street traffic shall be detoured via Parsons Avenue and Main Street, while westbound Broad Street traffic shall be detoured via Third Street. Lane width and shoulder width reductions are permitted on this ramp. Lane widths, shoulder widths, and barrier offsets shall comply with the criteria listed in Section 16.5.

**16.8.3 I-670 Eastbound Ramps**

**16.8.3.1 I-670 Eastbound to Cleveland Avenue**
The exit ramp from I-670 Eastbound to Cleveland Avenue may be closed during construction. During such a closure, traffic shall be detoured via Third Street and Naghten Street. This ramp may be closed for
a maximum of 90 days during this project. Disincentives shall be applied at a rate of $1,000 per day to the DBT for the duration of the ramp closure exceeding the maximum number of days.

16.8.3.2 Cleveland Avenue to I-670 Eastbound/I-71 Northbound
The entrance ramp from Cleveland Avenue to I-670 Eastbound/I-71 Northbound may be closed during construction. During such a closure, northbound Cleveland Avenue traffic shall be detoured via Fifth Avenue, while southbound Cleveland Avenue shall be detoured via Mount Vernon Avenue and Fourth Street. A conceptual signing diagram for these detour routes can be found in Appendix MT-03. This ramp may be closed for a maximum of 365 days during this project. Disincentives shall be applied at a rate of $1,000 per day to the DBT for the duration of the ramp closure exceeding the maximum number of days.

16.8.3.3 I-670 Eastbound to I-71 Southbound
The movement from I-670 Eastbound to I-71 Southbound may be closed during construction. If such a closure is necessary, traffic shall be detoured to SR 315 Southbound and I-70 Eastbound. During such a closure, the DBT shall place signage on Neil Avenue and Summit Street at the entrance ramps to I-670 Eastbound to inform drivers of this ramp closure. This movement shall be closed for a maximum of 60 days during this project. Disincentives shall be applied as a rate of $5,000 per day to the DBT for the duration of the ramp closure exceeding the maximum number of days.

This movement can be accommodated either via the I-670 Eastbound ramp to I-71 Southbound or via the I-670 Eastbound ramp to Broad Street, which provides a connection to I-71. If both connections are open, only one of these two ramps shall be signed as the designated ramp for the I-670 Eastbound to I-71 Southbound movement. This movement, if entering I-71 on the left-hand side, shall add a through lane onto I-71. A left-hand merge onto I-71 shall not be permitted.

16.8.3.4 I-670 Eastbound to I-71 Northbound
The ramp from I-670 Eastbound to I-71 Northbound shall be maintained at all times that I-670 Eastbound is open to traffic. One (1) lane is required to be maintained for this ramp.

16.8.4 I-670 Westbound Ramps

16.8.4.1 I-670 Westbound to Cleveland Avenue
The ramp from I-670 Westbound to Cleveland Avenue/Jack Gibbs Boulevard may be closed during construction. If such a closure is necessary, traffic shall be detoured to Cleveland Avenue via the Broad Street exit ramp from I-71 Southbound. This ramp shall be closed for a maximum of 60 days during this project. Disincentives shall be applied at a rate of $1,000 per day to the DBT for the duration of the ramp closure exceeding the maximum number of days.

16.8.4.2 Cleveland Avenue to I-670 Westbound
The ramp from Cleveland Avenue/Jack Gibbs Boulevard to I-670 Westbound may be closed during construction. During such a closure, northbound Cleveland Avenue traffic and westbound Jack Gibbs Boulevard traffic shall be diverted via Cleveland Avenue and Fifth Avenue, while southbound Cleveland Avenue shall be detoured via Mount Vernon Avenue and Fourth Street. This ramp shall be closed for a
maximum of 90 days during this project. Disincentives shall be applied at a rate of $1,000 per day to the DBT for the duration of the ramp closure exceeding the maximum number of days.

**16.8.4.3 I-670 Westbound to I-71 Southbound**

The ramp from I-670 Westbound to I-71 Southbound shall be maintained with at least one (1) lane at all times. This ramp shall add a drop lane to the Broad Street exit ramp.

### 16.9 City Street Closures and Restrictions

The following lists the allowable closures and restrictions for the major City of Columbus streets in the project area. The duration of road closures shall be minimized by the DBT. The DBT shall maintain and detour pedestrian traffic on City streets in accordance with TEM 640-25. ADA-compliant pedestrian access shall be maintained at all times on at least one side of any street that is open to vehicular traffic.

Disincentives shall apply if the DBT exceeds the allowable timeframes for City street closures specified below. Unless otherwise stated, disincentives shall apply at a rate of $1,000 per day to the DBT for the duration of the street closure exceeding the maximum number of days.

#### 16.9.1 Long Street

Long Street may be closed to traffic between Jefferson Avenue and Hamilton Avenue. Long Street shall be closed for a maximum of 180 days during the project. Long Street shall not be closed at any time that Spring Street is closed. During closure of Long Street, traffic shall be detoured to Broad Street via Cleveland Avenue as per the conceptual detour plan provided in Appendix MT-03. Disincentives shall be applied at a rate of $10,000 per day to the DBT for the duration of the Long Street closure exceeding the maximum allowed 180 days. Incentives shall be applied at a rate of $10,000 per day for each day the total duration of closure is less than 180 days, with a maximum total incentive of $400,000. A minimum of two (2) lanes shall be provided when Long Street is open to traffic. Any day which has less than two (2) lanes open during peak hours will be considered a closure day. Extensions of time will be for calendar days and calculated in accordance with C&MS 108.06 except as follows: no extensions of time will be granted for delays in material deliveries (unless such delays are industry-wide), labor strikes (unless such strikes are area-wide), and inclement weather except in cases of area flooding, blizzard conditions, damaging wind or local tornado damage.

If short-term lane closures are needed, these lane closures shall be scheduled for off-peak travel times to minimize traffic disruption.

The detour route requires drivers to make an eastbound left turn from Broad Street onto 17th Street. This movement is currently prohibited. The City of Columbus will modify the Broad/17th signal during this detour to allow this movement. The DBT shall coordinate with the Department to ensure that this intersection is modified prior to the detour implementation.

During closure of Long Street, the DBT shall erect wayfinding signs for the King Arts Complex and the Lincoln Theatre. Wayfinding signs shall be erected along the detour route. These wayfinding signs shall contain the logos of these two facilities.
16.9.2 Spring Street

Spring Street may be closed to traffic between Jefferson Avenue and Hamilton Avenue. Westbound traffic shall be detoured via Hamilton Avenue, Long Street, 17th Avenue, Broad Street, and Washington Street. A conceptual detour plan is provided in MT-03. Spring Street shall be closed for a maximum of 180 days during the project. Spring Street shall not be closed at any time that Long Street is closed.

Disincentives shall be applied at a rate of $10,000 per day to the DBT for the duration of the Spring Street closure exceeding the maximum allowed 180 days. Incentives shall be applied at a rate of $10,000 per day for each day the total duration of closure is less than 180 days, with a maximum total incentive of $400,000. A minimum of one (1) westbound lane shall be provided when Spring Street is open to traffic. Extensions of time will be for calendar days and calculated in accordance with C&MS 108.06 except as follows: no extensions of time will be granted for delays in material deliveries (unless such delays are industry-wide), labor strikes (unless such strikes are area-wide), and inclement weather except in cases of area flooding, blizzard conditions, damaging wind or local tornado damage.

16.9.3 Cleveland Avenue

Cleveland Avenue traffic shall be maintained with at least two (2) through lanes in each direction from 6:00am-8:00pm, except for a 2-week period commensurate with work to widen Cleveland Avenue. During this widening, Cleveland Avenue may be reduced to one lane in each direction. Any time that lanes are closed in the designated allowable time frames, lane rental charges shall apply at a rate of $250 per lane per day (June 1 - September 30) and $500 per lane per day (October 1 – May 31). Any time that lanes are closed outside of the designated allowable time frames, disincentives shall apply at a rate of $300 per hour per lane.

Left turns from Cleveland Avenue shall be prohibited at any location where only one through lane exists and a left turn lane is not provided. Bus stops located in the area reduced to one lane per direction shall be relocated north or south to a location where 2 lanes are provided in each direction. Coordination with COTA is required, as noted in Section 16.2.2.

Two (2) lanes in each direction and at least one sidewalk on Cleveland Avenue shall be open during the first week of each Columbus State academic quarter. To assist pedestrians crossing Cleveland Avenue, a LEO shall also be provided during the first week of each Columbus State academic quarter coinciding with any work on Cleveland Avenue. Jefferson Street shall also be maintained with two-way operations during the first week of each Columbus State academic quarter. A copy of the Columbus State future academic quarter schedules is provided as Appendix MT-05.

16.9.4 Jack Gibbs Boulevard

The portion of Jack Gibbs Boulevard between Cleveland Avenue and the I-670 ramps shall remain open with one lane in each direction at all times. However, the portion between the I-670 ramps and St. Clair Avenue may be closed. During such closures, traffic shall be diverted as per the conceptual plan in Appendix MT-03. During such a closure, the shared-use path shall be detoured via St. Clair Avenue, 2nd Avenue, and Cleveland Avenue. Jack Gibbs Boulevard may be closed for a maximum of 30 days during the project. Disincentives shall be applied at the rate of $500 per day to the DBT for duration of the street closure exceeding the maximum number of days.
16.9.5 St. Clair Avenue
Two-way traffic shall be maintained on St. Clair Avenue except as noted. One-lane two-way (OLTW) traffic operation is permissible when flaggers are present. Otherwise, two-lane two-way (TLTW) traffic shall be provided. Weeknight and weekend road closures between Leonard Avenue and Reynolds Avenue (under I-670) are permitted, with vehicular traffic and pedestrians detoured via Fifth Avenue, Joyce Avenue and Leonard Avenue.

16.9.6 Leonard Avenue
Two-way traffic shall be maintained on Leonard Avenue at all times except as noted. One-lane two-way (OLTW) traffic operation is permissible when flaggers are present. Pedestrian access shall be provided on at least one side of the street at all times.

16.9.7 Neil Avenue
During times that I-670 eastbound has lane restrictions, alternate route signage shall be placed on Neil Avenue to help direct traffic toward the convention center ramps (I-670 Spur). This can reduce traffic volumes on I-670 eastbound through the construction zone. A depiction of the conceptual signing plan for this alternate route signing is located in Appendix MT-03.

16.10 Improvements to Existing Roadway Network
The DBT shall maintain and restore detour routes as per Section 16.4.10. The DBT shall modify any existing pavement marking to implement the TMP, in accordance with Department standards.

16.10.1 Leonard Avenue & St. Clair Avenue Signal Improvements
Prior to any long-term closure of the I-71 Northbound to I-670 Eastbound ramp, the DBT shall improve the signals at the Leonard Avenue/St. Clair Avenue intersection. The intersection shall be improved to provide the following during the duration of the long-term closure:

- Controller capable of 4-phase operation
- Time-based coordination (TBC) capable
- Protected-permissive westbound left turn phase
- Westbound signal head replaced to provide 5-section head for left turn display. It is the responsibility of the DBT to ensure that the existing strain pole/span-wire system can support the additional load of the 5-section head.
- Detection for the westbound left turn lane

These improvements are only necessary to be implemented if the I-71 Northbound to I-670 Eastbound ramp is closed for a period of 48 consecutive weekday hours or more.

16.10.2 I-70 Westbound & SR 315 Northbound Improvements
The following improvements shall be made prior to closure of the I-71 Northbound to I-670 Westbound ramp, if the ramp is closed for more than 120 days:
• An additional travel lane shall be striped on the I-70 Westbound shoulder between I-71 and SR 315. This shall be done using the existing shoulder width. All travel lanes on I-70 Westbound shall be a minimum of 11 feet in width.
• An additional travel lanes shall be striped on the SR 315 Northbound shoulder between I-70 and I-670. All travel lanes on SR 315 shall be a minimum of 11 feet in width.
• An additional travel lane shall be striped on the ramp from I-70 Westbound to SR 315 Northbound. All travel lanes on this ramp shall be a minimum of 11 feet in width.
• The barrier between SR 315 Northbound and the entrance ramp from I-70 Westbound (entering on the left) shall be moved 2 feet to the east in the vicinity of the entrance gore. This shall allow for two lanes of traffic on the ramp from I-70 Westbound to SR 315 Northbound.
• The entrance ramp from Third Street to I-70 Westbound shall be restriped so that vehicles travel on the existing right-hand ramp shoulder (northern portion of existing pavement). This shall allow for approximately 400 feet of acceleration lane on I-70 Westbound.
• The SR 315 Northbound exit ramp to Long Street shall be reduced to one (1) lane at the diverge point.
• Overhead signs shall be modified and/or realigned in accordance with this revised configuration.

A graphic depicting the above improvements is provided as MT-06.

16.11 Law Enforcement Officers (LEOs)

The TMP shall identify and include the use of Law Enforcement Officers (LEOs).

LEOs with patrol cars shall be required for the following situations:
• LEOs shall be provided during the entire advance preparation and closure sequence where complete blockage of traffic is required.
• LEOs shall be used when construction vehicles are entering/exiting the work zone directly from/into an open lane of traffic. If a lane has been closed to provide an acceleration/deceleration lane for the vehicle, the LEO shall not be required.
• LEOs shall be used for lane closures during initial set-up periods, tear down periods, substantial shifts of a closure point or when new lane closure arrangements are initiated for long-term lane closures/shifts (for the first and last day of major changes in traffic control setup). In general, LEO’s shall be positioned at the point of lane restriction or road closure and to manually control traffic movements through intersections in work zones.

LEO’s without patrol cars shall be required for the following situations:
• LEOs shall be provided at a traffic signal when impacting the normal function of the signal or the flow of traffic, or when traffic needs to be directed through an energized traffic signal contrary to the signal display (e.g. directing motorists through a red light).
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February 22, 2011

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