Indiana Finance Authority
One North Capitol Avenue, Suite 900
Indianapolis, Indiana 46204

TECHNICAL PROVISIONS

I-69 SECTION 5 PROJECT

Request for Proposals
ADDENDUM #1 – NOVEMBER 26, 2013

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1 GENERAL SCOPE OF WORK

1.1 Project Description

The Project begins at State Road 37 in Bloomington, IN and extends north approximately 21 miles to SR 39 in Martinsville, IN. The Project extends through Monroe and Morgan Counties, Indiana, with the majority of the Project being in Monroe County. The purpose of the Project, as well as the broader I-69 project, is to strengthen the transportation network in the State, support economic development in the region and complete the portion of the broader I-69 project between Evansville and Indianapolis.

1.2 Project Datum

Developer shall provide or verify all survey information necessary to complete the Work. Project surveys and D&C Work shall be completed in the I-69 East horizontal datum and in the NAVD88 vertical datum. English units shall be used in the Project.

1.3 Coordination With Other Projects

1.3.1 Coordination

Developer shall coordinate all design and construction, including that of any of its Contractors, with other designers, contractors, the Utility Owners, governmental agencies, IFA personnel, Department personnel, and other operating personnel concerning site access, the establishment and use of temporary facilities, work schedules, and other elements of the specified Work that require interface with others.

1.3.2 Coordination with Other Work

INDOT and other agencies will have separate projects active within the Project Limits that are not part of the Project. Developer shall be responsible for coordinating its activities with this construction work. Delays arising from coordination issues shall not be considered a Relief Event. Known projects include:

1.3.2.1 INDOT Projects

1. I-69 Section 4, Segment 9 (Department Contract IR-33742): This project is located on PR 69 at Branch of Clear Creek to SR 37 and will connect with the I-69 Section 5 project. Anticipated completion is May 2015.

2. SR 37/Walnut Street Ramp (Department Contract number B-30982): This project is a bridge deck replacement located approximately 2.9 miles north of SR 46. It is scheduled to be let in November 2013.

3. SR 37 Clearing Contract (Department Contract IR-36031): This project includes tree clearing from That Road to Walnut Street. Anticipated completion is April 2014.

1.3.2.2 City of Bloomington Projects

1. South Rogers Street (scheduled for completion in 2014)

2. West Bloomfield Road/Weimer Drive roundabout (scheduled for completion in [to be provided]

1.3.2.3 Monroe County Projects

1. Kinser Pike Bridge No 46 (Des. No. 1173326 and scheduled for FY 2015 Construction)
2. Fullerton Pike (Des. No. 0801059 – Phase 1 scheduled to start in FY 2016)

1.4 Construction Requirements

1.4.1 General Requirements

The Department's Standard Specifications shall govern all Construction Work unless otherwise modified by these Technical Provisions. Where two or more standards or guidelines conflict, the more stringent shall govern.

1.5 Project Management

1.5.1 Key Personnel

Developer shall provide Key Personnel in accordance with Section 7.4 of the PPA. Refer to Section 7.4 of the PPA for information regarding time-commitment requirements for Key Personnel and IFA rights regarding Key Personnel and Section 1.5.3 for location requirements.

1.5.2 Project Administration

1.5.2.1 Project Schedule

Developer shall provide a Project Schedule in accordance with Recurring Special Provision 108-C-215 as supplemented by this Section 1.5.2.1. The Project Schedule shall be used by the Parties for planning and monitoring the progress of the Work. Developer shall use Oracle Primavera P6, release 6.2 or higher. Upgrades during Construction shall be mutually agreed to by the IFA and Developer.

1.5.2.1.1 Project Baseline Schedule

The Project Baseline Schedule and the Preliminary Project Baseline Schedule shall conform to the Baseline CPM Schedule in Recurring Special Provision 108-C-215. Developer shall submit the Project Baseline Schedule no later than 90 Days following NTP1 for approval by the IFA in its sole discretion. IFA will review the Project Baseline Schedule in accordance with Recurring Special Provision 108-C-215.

Each activity on the Project Baseline Schedule shall be assigned a cost by Developer for the purposes of calculating and tracking earned value. The cost loading of the schedule will be reviewed by IFA as described in preceding paragraph.

1.5.2.1.2 Project Status Schedule

Developer shall submit to IFA Project Status Schedule updates to reflect the current status of the Project including recovery schedules, schedule revisions due to Relief Event determinations, and approved Change Orders.

The Project Status Schedule shall conform to the Monthly Update CPM Schedule in Recurring Special Provision 108-C-215. The Project Status Schedule shall be submitted to IFA in accordance with Recurring Special Provision 108-C-215 for approval.

1.5.2.1.3 Progress Report

Each month, beginning with the first full month after NTP1, Developer shall submit to IFA the Progress Report for review and comment ("Progress Report"). Developer shall submit the Progress Report on or before the close of business seven Days following each month's end. An electronic and printed copy of the entire Progress Report shall be submitted to IFA.

The Progress Report shall contain a narrative which shall include the following information:

1. Describe progress as a whole, including all phases of Work. Identify start date and completion dates on major areas of Work. Group the information based on the WBS.
2. Summarize QA/QC findings.
3. List any Change Orders that were identified or executed during the period. Include their status.
4. Identify any pending or resolved Claims during the period.
5. Identify schedule activities planned for the upcoming period.
6. Identify problems and issues that arose during the month and issues that remain to be resolved.
7. Summarize resolution of problems/issues raised in previous progress reports or resolved during the period.
8. Identify Critical Path issues and proposed resolution.
9. Provide a report on the Project Schedule Deadlines showing the schedule dates for the immediate prior month and current month. A narrative is required to explain why the dates have changed for variances greater than 30 days.
10. Provide monthly expenditure projection curves.
11. Provide monthly earned value report for all activities and a total earned value for the Project.
12. Identify requested and/or required IFA actions for the next month.
13. Provide digital progress photographs that accurately depict project progress as outlined in the Progress Report narrative.

If requested by IFA, Developer shall make all corrections to the monthly Progress Report and resubmit. If Developer does not agree with IFA's comments, Developer shall provide written notice of disagreement within seven days from the receipt of the comments.

1.5.2.1.4 As-Built Schedule

Developer shall submit an as-built schedule in conformance with the Final CPM Schedule in Recurring Special Provision 108-C-215. The as-built schedule shall be submitted to IFA in accordance with Recurring Special Provision 108-C-215 for approval.

1.5.2.2 Revisions

If it becomes necessary to add, combine, eliminate, or modify Milestone Payment or schedule Activities to reflect modifications to the Work, such changes shall be made through a Change Order that has been issued by IFA, and therefore reflected in the Project Schedule. Revisions to the Project Schedule and consequent realignment of funds between payment activities may be requested by Developer in accordance with, and subject to, Section 15 of the PPA.

1.5.2.3 Time Impact Analysis

As part of a Relief Request as set forth in Section 15.1.2 of the PPA Developer shall submit to IFA a written time impact analysis illustrating the influence of each claimed Relief Event. Each time impact analysis shall include a fragmentary network demonstrating how Developer proposes to incorporate the change, delay, or Developer request into the current Project Status Schedule.

The time impact analysis shall demonstrate the time impact to each and every affected schedule Activity in the most recent Project Status Schedule at the time of the occurrence.

The time impact analysis submittal shall include the details of the change, including added, changed or deleted data for schedule Activities and logic. If the current Project Status Schedule is revised subsequent to submittal of a time impact analysis but prior to its approval, Developer shall promptly indicate in writing to IFA the need for any modification to its time impact analysis.

Developer shall submit one printed Gantt chart including all schedule Activities affected by the time impact analysis, grouped and sorted by WBS and compared to the current Project Baseline Schedule. In addition, Developer shall provide one electronic backup of the Project Schedule with the time impact analysis and a comprehensive narrative for each Relief Request. Developer shall incorporate the results of the Relief Event Determination from IFA into the Project Status Schedule for the next Progress Report.

1.5.2.4 Recovery Schedule

If the Work is delayed on any Controlling Work Item for a period which exceeds the greater of either 30 days in the aggregate or that number of days in the aggregate equal to 5 percent of the days remaining until Substantial Completion, the next Project Status Schedule shall include a recovery schedule demonstrating the proposed plan to regain lost Project Schedule progress and to achieve Substantial Completion by the specified date.

1.5.2.5 Project Management Plan

Developer shall provide to IFA a Project Management Plan (PMP) in accordance with the schedule and approval requirements provided in Attachment 1-1. Developer's project management effort shall be defined by and follow the Project Management Plan (PMP), which is a collection of several management plan elements describing discrete Elements of the Work.

IFA shall have approval rights over the Project Management Plan and each component part of the Project Management Plan, unless expressly stated otherwise in these Technical Provisions. The Project Management Plan is an umbrella document that describes Developer's managerial approach, strategy, and quality procedures to complete the Work and achieve all requirements of the PPA Documents.

The structure, submittal time frames and IFA review and, as applicable, approval rights regarding each component part of the Project Management Plan are specified in Attachment 1-1. Table 1-1 provides a general outline of the PMP.

Table 1-1 Project Management Plan Outline

PMP Chapter	Chapter Title
1	Project Administration
2	Quality Management Plan
2A	Design Quality Management Plan
2B	Construction Quality Management Plan
3	Environmental Management
4	Public Involvement Plan
5	Safety Plan
6	Communications Plan
7	Operations and Maintenance Plan
8	Durability Plan

A listing of documents to be included in the Project Management Plan is contained in Attachment 1-1 and related requirements for the component parts appear throughout these Technical Provisions.

Developer shall propose updates to the PMP and, as applicable, affected components in the event of the following:

- The occurrence of any changes to Key Personnel, Quality Plan, Safety Plan, Project Schedule, project administration policies and procedures
- The occurrence of other changes necessitating revision to the PMP
- As otherwise directed by IFA

Developer shall provide the revised PMP to IFA for approval no later than 14 days after the occurrence of the change or direction triggering the need for the revisions to the PMP.

IFA will audit and monitor the activities described in the PMP to assess Developer performance. All commitments and requirements contained in the PMP shall be verifiable in audits to be conducted by IFA.

1.5.2.6 Document Management

In the provision of a document management system, Developer shall:

1. Use data protocols, standards, and procedures compatible with those employed by IFA and implement any new operating practices required as a result of IFA's amendments to any such systems, standards, and procedures.

2. Provide a secure location for any interface as may be provided by IFA, such that only authorized users have access and that it is protected from loss, theft, damage, unauthorized or malicious use.

3. Employ appropriate standards and procedures, and train Developer personnel to operate any IFA data management system which IFA may require in connection with the Project.

4. Developer shall train IFA personnel to operate any Developer data management system approved by IFA for Developer use in connection with the Project.

5. Provide a mechanism for the electronic transfer of meta-data along with the associated portable document format (PDF) images for uploading into an Electronic Document Management System (EDMS).

6. Provide IFA with procedures and software for accessing all Project-related documents as a component of Developer's obligations under Article 23 of the PPA.

All Project-related documents shall be provided to IFA in a searchable electronic format and legible.

In the Project Management Plan, Developer shall provide a detailed description of:

1. Methods by which all Project-related documents will be uniquely coded and retrievable in a user-friendly format.

2. The routing, filing, control, and retrieval methods for all documents.

3. Methods to facilitate sharing of data, including procedures and software for accessing all Project-related documents.

4. All documents and data elements that will support records. These data elements shall include, as a minimum: document class, document type/subtype, document name, form number, IFA records series item number, IFA agency item number, IFA records series title, IFA retention period, turnover media, turnover frequency, submission type, special requirements, and remarks.

To allow for disaster recovery, Developer shall back-up and store all Project-related documents in a secure off-Site area.

1.5.3 Project Office

Developer shall establish a Project Office within 90 days after NTP1, located within 1 mile of any point of the Project and within 500 yards of a bus route. The purpose of the Project Office is to consolidate and co-locate Developer's key management, design, construction, quality, and compliance functions and IFA's management, Oversight, and compliance staff in order to facilitate the teamwork, communications, and interaction called for by the PPA Documents and necessary to ensure a successful project. The Project Office shall remain open and fully functional as specified herein until 90 days after Final Acceptance.

IFA's section of the Project Office shall conform to the requirements of this Section 1.5.3 and the Type C field office described in Standard Specifications Section 628. Where discrepancies arise between the two documents, the larger, higher-quality, or newer technology shall be provided.

The Project Office shall include the following:

1. Project display room for I-69 Section 5: This room shall be open to the public weekdays from 9 am to 4 pm and by appointment. The room shall accommodate display materials and other Project materials available for public review (e.g., NEPA documents, construction plans and maps).

2. Two conference rooms: One room shall accommodate 20 people at a conference table. The second room shall accommodate 10 people at a conference table. The conference rooms shall be able to be secured during meetings. The conference room shall accommodate teleconferencing and provide Internet access.

3. IFA/INDOT offices as described later in this Section 1.5.3.

4. Office cleaning: Developer will be responsible for the cleaning of the IFA/INDOT offices facilities and trash pick-up and removal, including providing trash receptacles in all rooms.

1.5.3.1 Interim Project Office

Until the final office is established, Developer shall establish an interim office within 30 days after NTP1 in order to facilitate early communications and interaction between the staffs of Developer and IFA. The interim office is not required to be proximate to the Project. The amount of office space, including the accommodation of IFA staff, in the interim office will be as mutually agreed to by Developer and IFA during the initial office coordination.

1.5.3.2 Developer Personnel and Functions to be Located at the Project Office

At a minimum, the principal location of Developer's Key Personnel and other staff listed in (1) and (2) below is expected to be in the Project Office, along with support staff relative to their functions.

1. The following Developer Key Personnel shall be assigned to the Project Office on a full-time basis throughout the performance of their responsibilities:

    a. Project Manager

    b. Deputy Project Manager(s)

    c. Quality Manager

    d. Environmental Compliance Manager

    e. Safety Manager

2. The following Developer staff and Key Personnel shall be assigned primarily to the Project Office, acknowledging that some of their time on the Project will be spent in the field or design offices during the performance of their responsibilities:

a. Design Manager

b. Lead Engineer

c. Construction Manager

d. Design Quality Manager

e. Construction Quality Manager

f. Construction Quality Control Manager

g. Public Information Coordinator

h. Utility Manager

i. Erosion and Sediment Control Manager

j. Project Controls Manager

k. Lead Scheduler

l. Maintenance-of-Traffic Manager

m. Engineer(s) of Record

n. Operations and Maintenance Manager

o. DBE Coordinator

p. Karst Specialist

Although considered beneficial by IFA, it is left to the discretion of Developer as to whether design activities of the Project are located at the Project Office. If all or a portion of the design is not accomplished at the Project Office, it is required that the key design discipline leads spend a minimum of 10 percent of their time in the Project Office for the duration of their role on the Project.

It is required that all Design Reviews, Developer's design discipline (subject area) meetings including design, all meetings called for by the PPA Documents, and all coordination and other activities requiring IFA's consultation be held in the Project Office.

1.5.3.3 Office Facility

1.5.3.3.1 Developer's Responsibilities

1. Developer shall be responsible for the all-inclusive management, insurance, and costs of all capital, lease agreements, janitorial services and the maintenance of electrical; heating, ventilation, and air-conditioning (HVAC); plumbing; telephone systems; fax machines; copiers; computer systems; and equipment, including any maintenance contracts, supplies (paper for printers/copier/fax machines, ink cartridges, etc.), utilities, consumables (paper towels, pens, pencils, tape, etc.), and incidentals described elsewhere in the Technical Provisions to permit the efficient and uninterrupted operation of the Project Office. All facilities and build-outs/fit-outs shall be constructed and maintained in accordance with federal, state and local building codes.

2. Developer shall provide security of the Project Office, including protection of the building or space within a building against theft, 24 hours per day and shall take responsibility for loss of property of IFA or personal property of employees of IFA housed therein, due to fire, theft, or related causes, except that Developer is not responsible for non-Project-related personal property. Protection shall include a continually monitored security and alarm system.

3. In addition to the responsibility to maintain all internal office spaces and equipment, Developer shall be responsible for (either directly or through a building manager, depending on facility arrangements) the maintenance of the immediate grounds and landscaping and the removal of snow and ice, including the supply and application of deicing or ice-melting agents, from parking areas and walks in a timely manner to ensure safe passage to and from the Project Office.

1.5.3.3.2 IFA's Space Requirements

It is important that the space occupied by IFA be integral with that of Developer to facilitate teamwork and continuous interaction. However, IFA space shall be sufficiently separated within the overall Project Office space to allow internal IFA functions and interaction to take place apart from Developer's operations.

1.5.3.3.3 Management and Design Oversight

Developer shall provide the following space within the Project Office for IFA/Department design oversight and program management personnel:

1. Two private offices, each a minimum of 10 feet x 16 feet with a desk, chair, file cabinets, small conference table with four chairs per office, and lockable doors. These offices shall be near the front door of the Project Office and separated from Developer's offices by a secure door.

2. Five offices at a minimum of 120 square feet each with a desk, chair, file cabinets, and lockable doors.

3. 15 work cubicles at a minimum of 64 square feet each.

4. One work room of 200 square feet.

5. One file storage room of 300 square feet.

6. One secured computer network room of 144 square feet.

7. Lockable storage space of 100 square feet.

8. One field office desktop computer system with Internet access per desk.

9. One color laser printer .

10. One full-size plotter.

11. One multi-function color scanner/copier/facsimile machine for IFA/INDOT use in a separate copier room that includes 24 four-drawer file cabinets.

12. Internet system separate from the Developer's system.

13. Telephone system, separate from the Developer's system, that provides services to the conference rooms and each desk for the non-Developer offices and workstations described in this Section 1.5.3.

After design activities are substantially complete, a smaller Project Office may be provided, consistent with the requirements of a Department Type C field office, with the following exceptions:

1. A computer shall be provided for each desk.
2. This smaller office shall not be a trailer and will serve as IFA's management office on the Project.

1.5.3.3.4 Common Space and Equipment

Developer shall provide the following shared common space and equipment, adequate and appropriate for the efficient operations of the entire Project Office, for joint use by both the Developer and IFA personnel:

1. Varied-size conference room space to hold all reviews and meetings (one small conference room in space allocated for IFA is desirable)
2. Kitchen facility with sink, drinkable running water, microwave oven, refrigerator, coffee maker, and supplies
3. Reception area
4. Male and female bathrooms with cold and hot water

1.5.3.3.5 Facility Specifications

Developer shall provide the following in the Project Office:

1. Access and security lighting in the immediate areas of and exterior to the office, including but not limited to parking areas, walkways, hallways, and entrances.
2. An HVAC system for adequate heating and air conditioning throughout the general working areas, office spaces, and conference rooms, thermostatically controlled to ensure even office temperature distribution.
3. Appropriate furnished and installed office furnishings (new or refurbished and in good condition) for IFA-identified spaces, including desks, chairs, bookshelves, file cabinets, etc.
4. Telephone systems with independent service Department personnel as specified elsewhere in this Section 1.5.3.
5. Adequate parking facilities for the Project Office (immediately adjacent to or as close as possible), including dedicated spaces for 40 people. The parking facility shall consist of a hard pavement with clearly identified parking spaces.

1.5.3.3.6 Replacement

In case of fire, theft or breakdown, all furnishings and equipment involved shall be repaired or replaced by Developer within 48 hours of the incident. If the Project Office facility is destroyed or rendered unusable for any reason, Developer shall coordinate with IFA with the intent of replacing (temporarily and permanently) the facility, furnishing, equipment, and functions as soon as practical.

1.5.4 Field Offices

Developer shall provide a minimum of two Type C field offices in accordance with the Standard Specifications and modified by this Section 1.5.4. Each field office shall be twice the size as described in Standard Specifications Section 628. One field office shall be located within the Bloomington City Limits, and one shall be located along or within 500 feet of Chambers Pike. Developer shall provide in each field office an additional office field system per the Standard Specifications and as specified below:

- Blood-borne Pathogen Kit 2
- Broom and Dust Pan 2
- Calculators 0
- Carbon Monoxide Detector 2
- Chairs 24
- Cleaning Supplies Yes
- Drafting Stools 0
- Drafting Tables 0
- Drinking Water Yes
- File Cabinet Drawers 24
- Fire Extinguishers 4
- First-Aid Kit 2
- Folding Office Tables 4
- Microwave Oven 2
- Office Desks & Office Chairs 8
- Paper Shredder 2
- Pencil Sharpener 2
- Refrigerator/Freezer 2 (each 26 cubic feet minimum combined)
- Shelving (linear feet) 50
- Six-hook Coat Rack 2
- Smoke Detector 6
- Telephones Lines 10
- Telephones 10
- Toilet Facilities Yes (permanent with running water)
- Voice Mail 10
- Waste Paper Baskets 10

Developer shall provide satisfactory space and parking to accommodate the on-Site field oversight personnel of IFA provided in the same quantity and manner as provided to Developer's office staff, and consistent with the operations of a field office. Space requirements shall be coordinated with IFA at the field office coordination meeting. All costs of the field offices shall be borne by Developer.

1.5.5 Office and Field Office Coordination Meeting

Within two weeks after issuance of NTP1, Developer shall schedule a meeting with IFA to coordinate plans for both the interim and permanent offices and the construction field office(s), including the integration, accommodation, and incorporation of IFA's requirements.

1.5.6 Field Laboratory

Developer shall provide a Type C field laboratory at one of the field office locations. The field laboratory shall be as specified in Department Standard Specifications 628.02(f). In addition to the provisions of Section 628.02(f), Developer shall provide hot and cold running water (potable). Developer does not need to include telephone lines or telephones in the field laboratory.

2 QUALITY MANAGEMENT

2.1 General Requirements

Developer's Quality Management Plan is a component of Developer's PMP.

The structure of the QMP shall follow the layout described in TP Sections 3 and 4.

The QMP shall describe a quality system team that is distinct and separate from the design and construction production organization. The QMP shall address Developer-managed quality control efforts during Design Work and Construction Work. The organizational reporting of the quality system team shall be directly to Developer's Quality Manager. The QMP shall apply to all levels of Developer's organization, including consultants, Contractors, suppliers, and vendors at all tiers.

2.1.1 Quality Management Plan Submittal

The submittal of Developer's QMP shall be according to the timeframe specified in Attachment 1-1.

2.1.2 Quality Management Plan Reviews and Updates

The QMP shall include a schedule for review of the QMP by Developer's quality management team. Each review shall be documented and all recommended updates to the QMP shall be identified. The QMP shall include a process for resubmission, review, and IFA approval of updates to the QMP.

As Design Work and Construction Work progress, specific elements within the QMP may need to be revised and updated to reflect current and anticipated conditions.

The current, updated version of the QMP shall be located in the IFA accessible Project record.

2.1.3 Environmental Compliance and Mitigation Plan

Developer's Environmental Compliance and Mitigation Plan is a component of Developer's PMP.

The structure of the ECMP shall follow the layout described in TP Section 7.

The ECMP shall describe the appropriate controls applicable during the management, design, construction/installation, and documentation of environmental compliance and mitigation efforts. The ECMP shall include procedures designed to ensure that requirements of the ROD, FEIS, other Environmental Approvals, and Environmental Laws are identified and fulfilled.

The ECMP shall include:

- A description of how full compliance with defined commitments, conditions of Environmental Approvals, Environmental Laws, and IFA review and comment during Design Work is achieved.

- A description of how full compliance with defined commitments, conditions of Environmental Approvals, Environmental Laws, and IFA review and comment during Construction Work is achieved.
- A description of how and where impacts to woodlands, 4(f) resources, parklands, historical properties, Threatened or Endangered Species, wetlands, and waters of the United States are avoided or minimized.
- Developer's environmental compliance process, structure, organization location, level of documentation, forms of communication, and QA/QC processes and procedures.
- The corrective action process to keep the Project in compliance with Environmental Approvals, Environmental Laws, and Project commitments at all times.

2.1.4 Durability Plan

Developer shall include as part of its PMP a Durability Plan addressing durability for all structural Elements. The Durability Plan shall describe the durability design basis and the measures that Developer will adopt to ensure the necessary durability requirements are included in the Design Documents, the Construction Work, and the O&M Work. It shall be developed during design and updated annually after Substantial Completion to reflect the information available, such as inspection reports, analysis based on actual exposure conditions, and developments in industry practice related to the analysis and prediction of corrosion, deterioration, and other durability issues.

The Durability Plan shall identify the maintenance and monitoring strategy and the process for establishing and exceeding the specified condition rating of each structure at Substantial Completion and throughout the Term and exceeding the Residual Life of each Element of new and existing structures at Handback. The Durability Plan shall include the following, at a minimum:

- Identification of each structural Element with the corresponding environmental exposure conditions for each component (e.g., buried, submerged, exposed to atmosphere, exposed to corrosive chemicals). Some elements may be exposed to more than one environmental condition (e.g., foundations in water table, foundations in areas with petroleum contamination), which might require different corrosion considerations for each exposure.
- Identification of relevant degradation and protective mechanisms for each structural Element, quantifying the degradation processes and resistances to these processes with respect to time. The time-related changes in performance for each structural Element at intervals up to the required service life (including handover and handover minus 5 years) and the Design Life shall be predicted using deterministic models, published industry guidance, and test data, allowing for the environmental conditions, and any proposed protective measures. The models and all assumptions shall be clearly indicated in the plan.
- Description of measures taken during construction to ensure the assumed quality of construction is achieved (e.g., uniform compaction of concrete, adequate concrete cover, proper curing for the element).
- Summary of the above information, in a tabular format and an estimate of type and frequency of specific maintenance activities for each Element of the structure.
- List of manufacturers of all proposed durability enhancement measures, including coatings, inhibitors, sealers, and membranes.

- Schedule for corrosion inspection of structural components indicating the parameters to be measured in order to confirm the underlying performance relative to that predicted in the design.
- Proposed maintenance schedule for items that could be affected by corrosion.

2.1.5 Organizational Requirements

Developer's Quality Manager is classified as one of the Key Personnel and shall be responsible for overseeing the overall quality program, including the preparation, implementation, and updating of the QMP. Developer's Quality Manager is responsible for Developer's efforts in the area of quality assurance and quality control covering all Work necessary to achieve Substantial Completion.

Developer's organizational reporting structure shall clearly depict the Quality Manager reporting directly to a joint venture board, senior management, or similar level of Developer's organization not directly responsible for Design Work or Construction Work.

The Quality Manager shall attend all weekly progress meetings, and others as IFA may request.

The Quality Manager shall be the primary point of contact to IFA for all issues relating to Developer's QMP. The Quality Manager's authority and responsibility includes the following:

- Ensuring that the overall quality system is established, implemented, and maintained;
- Producing regular performance reports on the quality system to Developer's management for review and consideration as a basis for improvement of the quality system; and
- Direct supervision of the efforts of the Design Quality Manager and Construction Quality Manager relative to procedures included in the QMP.

2.2 Quality System Requirements

2.2.1 Management Responsibility

2.2.1.1 Quality Policy

A quality policy shall be defined and documented in the QMP by Developer's executive management. The quality policy shall include objectives for quality and the executive management's commitment to quality. In the context of this Section 2.2.1, executive management shall mean those persons to whom Developer's Project Manager reports and who have overall responsibility for Developer's performance.

The narrative to the quality policy shall explain the organization's commitment in terms of the services provided to IFA, and the responsibilities assumed by Developer to discharge its contracted accountabilities relative to IFA's overall responsibility for ensuring quality in the constructed facility.

The training on the QMP to all Developer staff shall specifically include the quality policy.

2.2.1.2 Quality Program Organization

The QMP shall describe Developer's Quality Program Organization relative to:

1. Responsibility and Authority:

   a. Executive management shall have the responsibility and authority to plan and determine the overall direction of Developer and its relationship to the quality program efforts. Executive management shall ensure the quality policy is documented, presented to, and understood by all employees and management by formal and informal indoctrination. Executive management shall ensure the implementation of the quality policy by everyone in the organization.

   b. Executive management shall communicate to all involved in the Project that the quality system is an integral part of the overall management system, and as such, is supported and implemented from the top down. Quality efforts are not to be considered the sole domain of the design checkers, QC inspectors, or QC personnel. All workers, including design and construction production personnel, including those of Contractors, shall be aware of the quality program requirements that govern their respective work.

   c. A current description of the organizational arrangements, including an organizational chart, shall be provided. The description and chart shall include all key positions and lines of communication and authority between Developer and IFA and their representative(s), and with other organizations involved.

   d. The personnel who manage, perform, and verify Work affecting quality shall be identified, particularly those who require the organizational freedom and authority to do the following:

      1) Initiate action to prevent the occurrence of any nonconformities relating to the product, process, and quality system.

      2) Identify and record any issues relating to the product, process, and quality system.

      3) Initiate, recommend, or provide solutions to detected issues through designated channels. All Developer personnel, including Contractor personnel, are responsible for reporting any and all quality and safety problems.

      4) Confirm, in a timely manner, the implementation of solutions to detected issues. The verification shall also investigate if the solution to the detected issue has the potential to create another quality issue.

      5) Control any further processing, delivery, or installation of Nonconforming Work until the deficiency or unsatisfactory condition has been corrected. Controls shall be established, including stopping Work if necessary, once a significant quality issue is detected, until the cause of the issue can be identified and the required corrective action can be implemented.

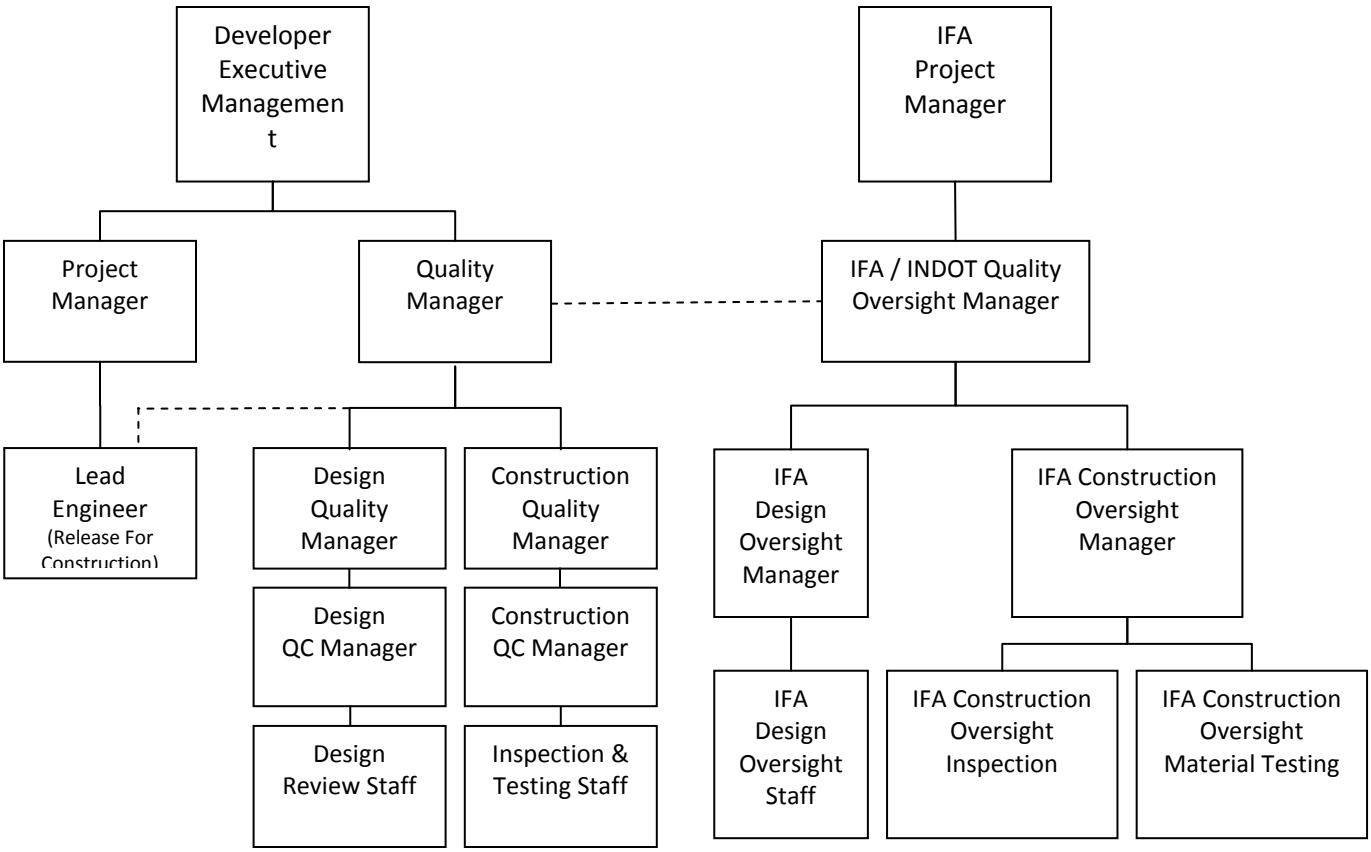

Figure 2-1 Project Quality Control and Quality Assurance and IFA Oversight Organization

2. Resources:

   a. The assignment of trained personnel; for management, performance of work and verification activities, including internal quality audits.

   b. A system for performing such activities as Design Reviews, verification, receiving, in-process and final inspections, and internal quality audits.

   c. The source of staffing, including management, professional, technical, and labor, and the integration of resources into the specific requirements of the PPA Documents.

   d. Other resources necessary to complete the Design Work and Construction Work, such as computers, craft tools, equipment, and facilities.

2.2.1.3 Management Review

The QMP shall include a description of how Developer's executive management intends to take ownership of the quality system. This description shall include how often a review of the system is necessary to ensure the system's continuing suitability and effectiveness in satisfying Developer's stated quality policy and objectives.

Each executive management review shall be documented to record the participants in the review, relevant points of discussion, action items and timeframes for resolution of issues. Documentation of each completed executive management review shall:

1. Be maintained as quality records
2. Be provided to IFA within 30 days of the management review date.

2.2.2 Quality System

2.2.2.1 General

The purpose of Developer's quality system is to ensure that the Work conforms to the requirements of the PPA Documents. The QMP shall include, or make reference to, the quality system procedures and outline the structure of the documentation used in the quality system. Should the QMP only reference the procedures, the levels of the documented system, its contents, and the interrelationship of the document types shall be described.

The Work covered by the quality system shall include both temporary and permanent components.

The QMP shall include a 'roadmap' that aligns each applicable element in the quality system. The roadmap may be a cross-reference, narrative, chart, index, or similar method.

The QMP shall detail the roles, responsibilities, and authority of Developer, each Developer-Related Entity, Designer, Lead Engineer, Quality Manager, Design Quality Manager, Construction Quality Manager, Construction Quality Control Manager, and other team members having a significant role in implementing the quality system.

The QMP shall include all organizational interfaces.

2.2.2.2 Quality System Procedures

Quality system procedures shall be consistent with Developer's stated quality policy.

The content of a quality system procedure shall document standard work methods and Good Industry Practice. Each quality system procedure shall contain controls that can accommodate a departure from the norm while ensuring the minimum standard of care is maintained.

The QMP shall identify the liaison and interface protocol between Developer's quality organization and the organization managing the design and construction production efforts.

The primary objective of each procedure is to facilitate employee understanding of the system.

The QMP shall include a description of the rationale for the procedures selected for inclusion in the QMP. If the procedures selected do not address every provision of this Section 2, Developer shall explain why the requirement is not applicable in each particular situation.

The Developer's quality system shall include the following, at a minimum:

a. Preparation, control, and distribution of the QMP

b. Internal quality audits

c. Management review of QMP

d. Review, verification, and validation of design products

e. Document issue, approval, and revision

f. Verification and control of computer programs used in design

g. Inspecting workmanship

h. Sampling and testing of materials

i. Calibrating testing equipment

j. Resolving Nonconforming Work

k. Traceability of deliverables, such as Design Documents, Construction Documents, and Record Drawings

l. Corrective/preventive actions

m. Handling, storing, packaging, tracking, and delivering PPA deliverables

n. Environmental compliance

o. Training

The structure of each procedure shall include:

a. Scope

b. Key Personnel

c. Organizational/technical interfaces

d. Input requirements

e. Output requirements (deliverables); IFA and Department participation

f. Levels of responsibility and authority

g. Actions to produce Work that conforms to requirements

h. Controls to ensure compliance to requirements

i. Method of verifying compliance to requirements

The QMP shall include Developer's standard procedures, as applicable to the Project, and Project-specific procedures important to quality for the Project. Project-specific procedures shall address elements of the Project scope not adequately covered by its standard procedures.

Reporting on the effectiveness of implementation of the quality system shall include internal quality audit reports, the trending of nonconformances, records of root-cause analysis, records of corrective and preventive actions, and records of IFA requirement verifications.

The range and detail of the procedures that form part of the quality system shall depend on the complexity of the Work, the methods used, and the skills and training needed by personnel involved in carrying out the activity. The procedures shall accurately reflect the Work to be accomplished.

Documented procedures shall make reference to applicable specifications that prescriptively define how an activity is performed.

The level of detail included in a procedure shall describe the process steps of what needs to be done. Additional details that prescribe how it is to be done shall be included in a work instruction.

2.2.2.3 Quality Planning

Quality planning shall be performed to ensure specific requirements of the PPA Documents have been identified and incorporated into the documented quality system. IFA's requirements in the PPA documents represent the minimum requirements.

Developer's quality planning shall be consistent with all other elements of Developer's quality system and in a format to suit Developer's methods of operation. Developer's quality planning shall include the following activities, as appropriate, in meeting the specified requirements for the Project:

- Preparing the QMP
- If Developer already has a quality system, blending the unique Project requirements into the quality system
- The Project objectives to be realized
- Identify responsibilities, authorities, interfaces, both internal and external
- Identify specific procedures, methods, and instructions to be used (standard and Project-specific)
- Identifying inspections, tests, audits, and surveillances to be performed
- Control of modifications and change to quality-defining documents
- Incorporating into the standard documents as a form of continuous improvement
- Identifying and acquiring any controls; processes; equipment, including inspection and test equipment; fixtures; resources; and skills that may be needed to achieve the required quality
- Ensuring the compatibility of the design, the production process, installation, servicing, inspection and test procedures, and the applicable documentation required for the Project
- Updating, as necessary, of quality control, inspection, and testing techniques, including the development of new instrumentation
- Identifying suitable verification at appropriate stages in product development
- Clarifying standards of acceptability for all features and requirements, including those that contain a subjective element
- Identifying and preparing quality records, which comprise such documents as audit inspection reports, approved designs, specifications, plans, calculations, purchase orders, Design Review records, vendor evaluation reports, and cumulative progress and audit reports.

2.2.3 Design Control

2.2.3.1 General

Developer is responsible for establishing and maintaining documented procedures to control the design of the Work to ensure that all applicable requirements are met.

Developer design control applies to computer programs, design tables, and other design products that provide analytical results that are used to develop or check designs.

The QMP shall include the detailed role of the:

- Designer
- Lead Engineer
- Design Manager
- Engineer of Record
- Environmental Compliance Manager
- Design Quality Manager
- Engineer(s) of Record

2.2.3.2 Design and Development Planning

The Developer's Design Quality Management Plan (DQMP) is a component of Developer's QMP and is a sub-component of the PMP.

Each design and development activity shall be described or referenced within the DQMP. Each design and development activity shall be assigned to qualified personnel who are equipped with adequate resources to complete the activity. As appropriate during design development, the DQMP shall be updated in accordance with the QMP revision process.

The DQMP shall include a description of the technical interfaces among the various entities that provide input to the design process or receive output.

2.2.3.3 Design Input

Prior to starting Design Work, Developer shall identify and review all applicable requirements for adequacy. Requirements considered incomplete, ambiguous, or conflicting shall be identified and discussed with IFA to clarify the understanding.

The essence of this sub-element is that Developer determines what information is needed and the available sources for information, reviews all pertinent available data, ensures that there is sufficient information to carry out its assignment, and resolves with IFA and other appropriate authorities any actual or apparent conflicts or inconsistencies in the information gathered.

All design input information, sources, and decisions taken by Developer shall be documented in some manner (e.g., design memos, minutes of design workshop, and task force meeting minutes) and included in the Project record.

2.2.3.4 Design Output

All outputs of design shall be verified against design-input requirements and validated. The DQMP shall include a description of how control of the design outputs is performed.

2.2.3.5 Design Review

At appropriate stages of design development, a review of the results of design shall be planned and conducted. Each planned Design Review shall include representatives of all functions concerned with the design stage being reviewed, as well as other specialist personnel, as required. The record of a Design Review shall include:

- Name of reviewers
- Stage of design development
- Scope of design reviewed
- Decisions resulting from review

Validation of each computer software program used to perform alternative calculations or verify clearances through the use of scale models or computer-aided design and drafting (CADD) techniques shall be completed before the use of the software program. Validation of any calculations performed by computer software shall be completed by providing representative hand calculations. The record of validation shall be documented in accordance with Section 2.2.15.

2.2.3.6 Design Verification

Design verification is the process of ensuring that specified requirements have been met.

The DQMP shall include procedures for verifying that the design output meets the design input requirements. Evidence of verification includes independent checks, tests, and reviews.

The Design Quality Manager shall be responsible for design verification.

Verification of designs provided by subconsultants shall be independently verified and documented under the direction of the Design Quality Manager prior to their approval and incorporation into the work of others.

2.2.3.7 Design Validation

Design validation is the process of ensuring that the design is acceptable for intended use.

The DQMP shall include a description of how Developer performs design validation.

2.2.3.8 Design Changes

After a design or portion of a design has been Released for Construction (RFC) all subsequent design changes and modifications shall be identified, documented, reviewed, and approved by authorized personnel before their implementation.

The DQMP shall include procedures on how design changes are initiated, reviewed, approved, implemented, and recorded. Design change procedures shall describe how to maintain

configuration control and the identification of persons authorized to approve design changes. Changes to RFC design may originate from IFA's request, an internal and external design organization, or Site or field personnel. Design changes may result in a modification of a Governmental Approval, which modifications would be subject to Section 4.3 of the PPA.

Any proposed changes shall be reviewed and approved by the Engineer of Record who produced the original Work. The degree and nature of control on design changes shall be the same or better than under which the original Work was accomplished. A version control system shall be in place to ensure that holders of the original material are provided with approved changes in a timely manner. All superseded information shall be removed from use when the updated document or record is received.

A master list of currently effective Design Documents shall be maintained to reflect design changes and approved modifications. The list of currently effective Design Documents shall be communicated to the construction personnel in a timely manner. A listing of the design changes shall be communicated to the construction Site on a timely basis, consistent with the progress of construction activities. The intent of this version control system is to ensure that no Work be performed without current knowledge of the approved design changes to be incorporated into the Work.

2.2.4 Document and Data Control

2.2.4.1 General

All documents and data that relate to the requirements of this Section 2 and other document management provisions of the PPA Documents are to be under version control. To the extent applicable, documents of external origin such as Project Standards and Department plans shall be under version control.

Types of Project-generated documents and data to be under version control include: Design Documents, Construction Documents, contracts, Plans, specifications, Governmental Approvals, master drawing lists or equivalent documents, critical procedures and work instructions, quality system manuals, Project quality plans, and data such as computer databases and computer files.

2.2.4.2 Document and Data Approval and Issue

The QMP shall include a procedure that defines the process for:

- Document review
- Resolution of comments
- Approval authority
- Distribution of appropriate documents to all locations where operations essential to the effective functioning of the quality system are performed
- Removal of invalid or obsolete documents from all points of issue or use

Developer shall ensure that documents and data are reviewed and approved for adequacy by authorized personnel prior to issuance. A master list of documents under version control shall be established, maintained, and be readily available.

2.2.4.3 Document and Data Changes

The QMP shall include a procedure that defines the process for the initiation, review, and approval of all document changes prior to issuance of those changes.

Changes to documents and data under version control shall be reviewed and approved by the same functions/organizations that performed the original review and approval, unless specifically designated otherwise in the QMP. If this is not possible, the designated approval authority shall have adequate background and experience upon which to base the decision. The designated functions/organizations reviewing and approving a version controlled document shall have access to pertinent background information upon which to base their review and approval.

2.2.4.4 Design and Record Drawings Format and Organization

If applicable, a plan for construction site staff to use digital versions of RFC Plans shall be submitted to IFA for review and approval. The plan shall include and describe:

- The digital hardware that will be used to view the digital version of RFC Plans
- How the digital versions of RFC Plans will be maintained as current
- How Developer will determine the sufficient number of new digital hardware devices, with the appropriate software, are required for IFA's use.

2.2.5 Procurement and Purchasing

2.2.5.1 General

The QMP shall include a procedure that defines the process for ensuring that purchased services and products conform to requirements of the PPA Documents.

Developer shall be responsible for the evaluation and selection of Suppliers, vendors, and Contractors.

The qualifications and any pre-qualifications of all Contractors, including consultants selected by Developer to complete a portion of the Work, shall be submitted to IFA and become part of the Project record.

2.2.5.2 Evaluation of Consultants, Contractors, Suppliers, and Vendors

The evaluation of consultants, Contractors, Suppliers, and vendors shall include:

- Their ability to meet Contract requirements, including the quality system and any specific QC requirements.
- A pre-selection description of the evaluation process for consultants, Contractors, Suppliers, and vendors of all tiers, including a description of the priority of quality as included in the QMP.
- A pre-selection description of the type and extent of control exercised by Developer over Contractors.
- The QMP shall include a description of the quality records generated to determine acceptable consultants, Contractors, Suppliers, and vendors. The quality records shall include the selection, control exercised over, performance, delivery, and quality of all consultants, Contractors, Suppliers, and vendors.

The methods Developer elects to use to control the delivery of the contracted service or product may include the following:

- Design Reviews
- Shop inspection
- Receiving inspection
- Witnessed inspection hold points

Procurement and purchasing documents shall contain data clearly describing the service or product ordered, including, where applicable, the following:

- The type, class, grade, or other precise identification
- The title or other positive identification, and applicable issues of specifications, plans, process requirements, inspection instructions, and other relevant technical data, including requirements for the approval or qualification of product, procedures, process equipment, and personnel
- The title, number, and issue of the quality system standard to be applied

The QMP shall include procedures that describe how and by whom procurement and purchasing documents are reviewed for adequacy of the specified requirements, how comments are resolved, and who in the organization has the authorization for final approval of the document.

2.2.5.3 Verification of Purchased Service or Product

When Developer verification of a purchased product or service is to occur at the Contractor's premises, the verification arrangements and the method of product release shall be specified in the procurement/purchasing documents.

When Department verification of subcontracted product or service is specified in the PPA Documents, Developer or IFA's representative shall be present to verify, at the Contractor's premises and Developer's premises, that a subcontracted product or service conforms to specified requirements. This verification is not to be used by Developer as evidence of effective control of quality by the Contractor.

The Contractors shall be responsible for fulfilling all of the specified procurement requirements regardless if IFA, Developer, or an agent performed any tests or inspections.

2.2.6 Control of Department-Supplied Items

The QMP shall include procedures for the control of verification, storage, and maintenance of Department-supplied items provided for incorporation into the Project or for related activities. These procedures shall detail the receipt/approval, storage, and maintenance (preservation) of these items.

If Department-supplied items are considered inadequate for the task required, the procedures shall detail the process used to report such deficiencies to IFA.

2.2.7 Product Identification and Traceability

The QMP shall include procedures for identifying the product by suitable means from receipt and during all stages of production, delivery, and installation.

The procedures shall identify items of work for which identification records are to be kept.

Identification records shall include document title, unique number, IFA's name, Developer's name, the preparer's name, and the date and revision number, unique identification and recording of individual product or batches, and the installed location of the equipment.

The procedures shall describe the traceability for filing and retrieval of operating manuals, certificates of compliance and, as applicable, analysis, heat numbers, inspection status, and nonconforming product.

2.2.8 Process Control

Developer is responsible to plan and control the Work.

The QMP shall include Project-specific work activity plans that define how Work is to be completed in conformance to applicable requirements. Work activity plans may be in the form of a narrative, flow chart, or control points. Work activity plans shall include the production, installation, and servicing processes that directly affect quality and describe the applicable process control efforts.

2.2.9 Inspection, Sampling, and Testing

2.2.9.1 General

The QMP shall include procedures for inspection, sampling, and testing activities in order to verify that the specified requirements for the Project are met.

QC inspection, sampling, and testing shall be performed in accordance with the proper issue of test procedures issued by industry, government, and, as applicable, code bodies available to test personnel or in accordance with written procedures developed and approved by Developer.

Quality check points and hold points for Work to be inspected and approved by the assigned QC inspector before Work can proceed shall be clearly established and identified on the Project Schedule or other suitable means. QC inspection procedures, logistics, and the reporting of inspection results shall be clearly defined, developed, and implemented.

2.2.9.2 Incoming Product Inspection and Testing

The QMP shall include procedures describing how all incoming product is inspected or otherwise verified as conforming to specified requirements prior to being incorporated into the Work.

The procedures are to describe:

- Documentation review
- Physical inspection of materials and equipment

- Identification of items per the purchase order and shipping list, tag number, or marking
- Verification of quantity and size
- Dimensional checks, when applicable
- Verification of protective coatings, if applicable
- Examination of item(s) for condition and shipping damage

2.2.9.3 In-Process Inspection, Sampling and Testing

The QMP shall include procedures describing how Work in-process is inspected, sampled, and tested and the necessary reports have been received and verified.

2.2.9.4 Final Inspection, Sampling and Testing

The QMP shall include procedures describing how all final inspection, sampling, and testing will be conducted in accordance with the requirements of the PPA Documents.

Records of final inspections and tests are required to verify that compliance with the specified requirements has been achieved. Records shall include the receipt of product or in-process inspection, sampling, and testing.

2.2.9.5 Inspection and Test Records

Inspection and test result records shall provide evidence that the product has been inspected and, as applicable, tested. These records shall demonstrate whether the product has passed or failed the inspections and, as applicable, tests according to defined approval criteria. Where the product fails to pass any inspection and, as applicable, test, the procedures for the control of nonconforming product is to apply.

2.2.10 Control of Inspection, Measuring, and Test Equipment

2.2.10.1 General

The QMP shall include procedures to control, calibrate, and maintain inspection, measuring, and test equipment — including test software — used by Developer to demonstrate the conformance of the Work to the specified requirements. Inspection, measuring, and test equipment shall be used in a manner that ensures that the measurement uncertainty is known and is consistent with the required measurement capability.

An engineering firm not associated with any part of the Design-Build Contractor team or IFA shall be retained and be assigned the responsibility to implement the procedures to control inspection, measuring, and test equipment. The Quality Manager shall ensure the engineering firm is implementing the control procedures without bias to the design build team.

The procedures to control, calibrate, and maintain inspection, measuring, and test equipment shall include:

- Definition of the responsibility and authority for the inspection, measuring, and test equipment
- Determining the accuracy and precision required, and obtaining equipment that meets those requirements

- Disposition of nonconforming equipment
- The identification, maintenance, and storage of measuring equipment
- Record keeping for equipment
- Calibration frequency
- Calibration status, including indicators
- Disposition of items checked with equipment found to be out of calibration
- Traceability of primary and secondary calibration standards

2.2.10.2 Control Procedure

The retained engineering firm shall perform the following:

- Determine the measurements to be made and the accuracy required, and select the appropriate inspection, measuring, and test equipment capable of the necessary accuracy and precision.
- Identify all inspection, measuring, and test equipment that can affect product quality, and calibrate and adjust them at prescribed intervals, or prior to use, against certified equipment having a known valid relationship to internationally or nationally recognized standards. Where no such standards exist, document the basis used for calibration.
- Develop a master calibration listing indicating the inspection and test equipment used. The log shall include, as a minimum, the identification number, item description, and the required frequency of calibration and accuracy requirements.
- Define the process employed for the calibration of inspection, measuring, and test equipment, including the details of equipment type, unique identification, location, frequency of checks, check method, approval criteria, and action to be taken when results are unsatisfactory.
- Show the calibration status on inspection, measuring, and test equipment with a suitable indicator or approved identification record.
- Maintain calibration records for inspection, measuring, and test equipment.
- When inspection, measuring, or test equipment is found to be out of calibration, assess and document the validity of previous inspection and test results.
- Ensure that the environmental conditions are suitable for the calibrations, inspections, measurements, and tests being carried out.
- Ensure that the handling, preservation, and storage of inspection, measuring, and test equipment is such that the equipment's accuracy and fitness for use is maintained.
- Safeguard inspection, measuring, and test facilities, including both test hardware and test software, from adjustments that would invalidate the calibration setting.

2.2.11 Inspection and Test Status

Following the inspection and test of products, the status of products shall be identified as conforming or nonconforming regarding the inspection and test performed. The QMP shall include procedures that identify how inspection and test status is to be maintained throughout the production, installation, and servicing of the product to ensure that only product that has passed the required inspections and tests is dispatched, used, or installed.

2.2.12 Control of Nonconforming Product

2.2.12.1 General

The QMP shall include procedures to ensure that nonconforming products are prevented from use (unintended or otherwise) or installation. These procedures shall describe how the nonconforming product is to be handled relative to identification, documentation, evaluation, segregation (when practical), disposition of nonconforming product, and for notification to the functions concerned.

2.2.12.2 Review and Disposition of Nonconforming Work

A nonconformance is defined as any condition in equipment, materials, or processes that do not comply with required plans, specifications, codes, standards, documentation, records, procedures, or requirements of the PPA Documents that cause the equipment, materials, or processes to be unacceptable.

Disposition status of Nonconforming Work may be one of the following:

- Rework – to meet the specified requirements
- Repair – following an acceptable repair procedure
- Reject and replace – replace with new product
- Use-as-is – with an agreed to reduction in payment as appropriate

Following the disposition resolution, the procedures shall describe the steps necessary to re-verify that the nonconformances have been adequately addressed and that the item then can be characterized as conforming.

As a record of nonconformance findings, each nonconformance record shall contain all deliberations, retesting, and resolution activities, findings, and decisions.

2.2.13 Corrective and Preventive Action

2.2.13.1 General

The QMP shall include procedures for implementing corrective and preventive action.

2.2.13.2 Corrective Action

The initial step in corrective action is to determine and investigate the cause of the failure.

Follow-up investigation shall occur to see if the corrective action resolved the identified problem, and also to ensure the corrective action did not have an undesirable effect on another element of the quality system.

2.2.13.3 Preventive Action

The purpose of preventive action is to eliminate the causes of identified nonconformities in order to prevent their occurrence.

Preventive action shall be appropriate to the effects of the potential problems. The results of preventive action shall be documented and reviewed for their effectiveness.

2.2.14 Handling, Storage, Packaging, Preservation, and Delivery

2.2.14.1 General

The QMP shall include procedures for the handling, storage, packaging, preservation, and delivery of product.

The procedures developed shall apply to all parties involved on the Project, beginning with Developer drafting the Construction Documents, all the way through to the personnel responsible for the start-up and turnover of the facility to IFA at the completion of construction; and for those elements within the O&M Limits at the turnover of the facility at the completion of the Term at handback. The specific application of the requirements shall be determined by the function performed: Developer, Contractors, Suppliers, manufacturer, distributor, vendor, warehousing, equipment operators, or installer.

The procedures shall designate which items require special handling, storage, or maintenance.

2.2.14.2 Handling

The procedures shall describe methods of handling products that prevent damage or deterioration.

For hazardous materials, special handling, clothing, and precautions shall be identified, with assurances that only qualified and trained personnel handle the material. The handling procedures shall include instructions to follow for decontamination and the notification of authorities and responsible parties in the event of an accident.

2.2.14.3 Storage

The procedures shall describe the designated storage areas or stock rooms to prevent damage or the deterioration of product, pending use or delivery. Appropriate methods for authorizing receipt to and dispatch from such areas shall be specified.

To detect deterioration, the condition of product in stock shall be assessed at appropriate intervals.

Items requiring protection shall be identified and protected as necessary to prevent loss, damage deterioration, or the loss of identification.

Special storage requirements shall be clearly defined for materials and equipment that are received on the Project; this includes plans, records, and operating manuals.

Materials shall be segregated to prevent cross contamination or environmental contamination.

Materials with limited shelf life shall be identified and procedures developed and implemented to identify the means of ensuring the usage of material prior to its expiration date. The procedures shall also identify the disposal of materials that may be toxic, hazardous, or might otherwise have an adverse effect on the environment or on unsuspecting humans.

2.2.14.4 Packaging

The procedures shall describe the control of packing, packaging, and marking processes (including materials used) to the extent necessary to ensure conformance to the PPA Documents.

Engineering and procurement documents shall specify applicable packaging requirements to ensure no damage, contamination, or deterioration occurs in the course of packaging and transporting the material and equipment. Procedures and work instructions shall define all special packing and packaging and marking process requirements, including export crating, moisture barrier, regulatory requirements, climate control, identification, and all requirements of the PPA Documents.

The labelling of hazardous materials, special handling instructions, and the notification of authorities and Developer shall be clearly and plainly identified on the packaging.

2.2.14.5 Preservation

The procedures shall include appropriate methods for the preservation and segregation of product when the product is under Developer's control.

Procedures shall include special unpacking instructions, the controlled conditions necessary to prevent or deter the deterioration of material or equipment and prevention of corrosion and, as applicable, contamination, and required servicing.

2.2.14.6 Delivery

The procedures shall describe the protection of the quality of product after final inspection and testing. This protection shall be extended to include delivery to destinations where the final inspection and testing is not on-Site.

When the delivery of equipment and, as applicable, materials to the jobsite is the responsibility of Developer, procedures or referenced appropriate standards shall be followed to protect the items during delivery.

2.2.15 Control of Quality Records

The QMP shall include procedures for the identification, collection, indexing, access, filing, storage, maintenance, and disposition of quality records.

Quality records shall be maintained to demonstrate conformance to requirements of the PPA Documents and the effective operation of the quality system. Pertinent quality records from the Contractor shall be an element of these data.

The procedures shall describe how records are to be adequately identified, filed, and stored. Retention periods and the storage medium of such records shall be in accordance with the requirements of the PPA Documents.

All quality records shall be legible and stored and retained in such a way that they are readily retrievable in facilities that provide a suitable environment to prevent damage or deterioration

and to prevent loss. Quality records shall be made available for inspection, duplication, audit, and evaluation by IFA in accordance with the requirements of the PPA Documents.

The procedures shall include the identification of the records necessary to provide objective evidence of review; of the PPA Documents; procedure compliance; Design Review, when applicable; training; and the completion and approval of inspection and testing — or to provide the traceability of equipment or items to documentation.

A list of Project-required records shall be developed, retained, and, as applicable, turned over to IFA prior to completing the Work.

2.2.16 Internal Quality Audits

The QMP shall include procedures for planning and implementing internal quality audits to verify whether quality activities and related results comply with planned arrangements and to determine the effectiveness of the quality system.

The procedures shall describe how internal quality audits are to be conducted in accordance with sound auditing principles. The frequency of the audits shall be appropriate to the importance and complexity of Project or corporate operation. The schedule of audits shall be included in the QMP and updated as the Work progresses. Audits shall be initiated early enough in the life of the Project to ensure effective quality control during all phases. The audits shall include project management as well as technical work activities.

Internal quality audits shall be carried out by personnel independent of those having direct responsibility for the activity being audited.

The internal quality audit program shall provide verification that the quality system is operating and being implemented as planned. Audits shall be conducted on a planned and scheduled basis, consistent with the importance of the activities being performed.

The results of the audits shall be recorded and brought to the attention of the personnel having responsibility in the area audited. The management personnel responsible for the area audited shall take timely corrective action on deficiencies found during the audit.

Follow-up audit activities shall be performed to verify and record the implementation and effectiveness of the corrective action taken.

The results of internal quality audits shall be reviewed in management review meetings. In accomplishing management review, the results of internal audits and their attendant corrective action status shall be reviewed for adequacy and effectiveness.

Auditor qualifications shall be established and documented. Staff assigned auditing tasks shall be qualified accordingly, with qualification records maintained as quality records. Auditing need not be a full-time assignment, but staff assigned auditing tasks shall have no direct responsibilities for the function or Work they audit.

Audits shall be carefully planned and executed to avoid or minimize disruption of the audited activity. Results shall be provided promptly to personnel responsible for the audited activity and their management. Corrective action shall be developed to identify the root causes and to institute measures to prevent the types of deficiencies identified in the audit. Corrective actions

shall be monitored through a review of documents, surveillance, or follow-up audits. These actions shall be conducted in a timely manner to determine the effectiveness of corrective action that is implemented. Records of corrective actions shall be kept together with the respective audit records.

Records of internal audits shall be maintained by Developer.

2.2.17 Training

The QMP shall include procedures for identifying training needs and provide for the training of all personnel performing activities affecting quality. Personnel performing specific assigned tasks shall be qualified on the basis of appropriate education, training, and, as applicable, experience, as required. Appropriate records of training shall be maintained.

Developer shall establish documented procedures and records to ensure that the skills and professional judgment of their personnel are developed appropriately for their intended roles, through training and, as applicable, the recorded accumulation of experience, with systematic reviews of their competence at determined levels, and before any deployment of new roles.

Training shall focus on improving competency and skill for those performing activities that materially impact quality.

All qualification and training records are quality records and shall be maintained accordingly.

Craft journeymen with special skills need not be trained, but their competency shall be verified and a record maintained of the verification.

2.2.18 Servicing

The QMP shall include procedures for performing, verifying, and reporting that the servicing meets the specified requirements for use when servicing of an installed product or equipment is a specified requirement.

The requirement of this Section 2.2.18 is applicable only where it is specified in the PPA Documents.

The procedures shall detail the methodologies to be used while performing the service, how compliance to these operations and IFA's requirements are verified, and the agreed-upon method of reporting compliance of service operations to the requirements of the PPA Documents.

2.2.19 Statistical Techniques

2.2.19.1 Identification of Need

Statistical techniques are required for establishing, controlling, and verifying process capability and product characteristics.

Activities benefit from the use of statistical techniques as a means of establishing a level of control, the maintenance of an existing level of performance, and the verification of performance. The application of statistical techniques is based upon an activity impact on cost,

time management/utilization, and the quality of deliverables. The application of statistics can also provide an indication of variation, activities efficiencies, and deviation control.

2.2.19.2 Procedures

The QMP shall include procedures to implement and control the application of the statistical techniques.

3 DESIGN QUALITY ASSURANCE, QUALITY CONTROL, AND OVERSIGHT

3.1 Designer Responsibilities

It is Developer's sole responsibility to provide Design Documents, Plans, and Construction Documents in order to complete the Work in accordance with the PPA Documents and Developer's Design Quality Management Plan (DQMP). The DQMP is a component part of the QMP and a sub-component of the PMP.

Prior to the review of Design Documents, Plans, and Construction Documents, Developer shall verify pertinent dimensions in the field. A review of Developer's Design Documents, Plans, and Construction Documents by IFA will not relieve Developer of the responsibility for the satisfactory completion of the Work.

Design Documents, Plans, and Construction Documents shall be subject to IFA's Design Review before beginning Construction Work covered by the Plans. Design Documents, Plans, and Construction Documents shall not be thereafter amended or altered without the prior approval of Developer's Designer and subsequent Design Review by IFA.

The DQMP shall provide the processes and procedures for how Developer shall perform the following:

1. Manage the Design Work and Design Work QA/QC.
2. Coordinate with and obtain necessary Governmental Approvals (excluding IFA-Provided Approvals). Governmental Approvals include those from authorities having jurisdiction for temporary road diversions and detours, shutdowns, utility relocations, temporary sidewalk closures, and pedestrian/bicycle detours.
3. Ensure that the Designer properly checks the Design Documents for the Project and that the Design Quality Manager certifies QC procedures in accordance with the PPA Documents and DQMP.

The procedures for the checking of the Design Documents of permanent components also apply to the Design Documents of major temporary components and construction sequences that affect the permanent components of the Project.

3.2 Developer's Design Organization and Obligations

3.2.1 Designer

The design of the permanent components and the major temporary components shall be undertaken by a suitably qualified and experienced Designer, which may be a consultant or an in-house design team. The Designer shall maintain all necessary representation throughout the duration of the PPA to ensure Developer can meet all its obligations under the PPA.

3.2.2 Location of Developer's Designer

The Designer may perform production Design Work in the Project vicinity or elsewhere. However, the Key Personnel shall be assigned primarily to the Project Office.

3.2.3 Completeness of Design

The Design Work will be considered complete upon Final Acceptance, following the submittal and review of the Record Drawings, in accordance with the PPA Documents and Project requirements.

3.2.4 Lead Engineer

A Lead Engineer shall be designated to manage all Work performed by Developer's Designer ("Lead Engineer") and shall be Key Personnel. The Lead Engineer shall be located in the Project vicinity as required for the Design Work, and shall be present as required thereafter to manage Design Work support during construction, design changes, and the completion of Record Drawings.

A certification that the RFC Documents satisfy the requirements of the PPA Documents shall be provided by the Lead Engineer to Developer and to IFA. The basis of the certification shall be assessment and evaluation of Design Work as performed by the Lead Engineer and staff working under the direct supervision of the Lead Engineer. The assessment and evaluation of the Design Work shall include the following elements:

1. Accuracy;
2. Adequacy;
3. Conformance to Good Industry Practice;
4. Compliance with Project Standards; applicable Laws, including codes, and standards; and Governmental Approvals;
5. Cost-effectiveness;
6. Conformance to requirements; and
7. Function as specified or implied in the PPA Documents.

A certification by the Lead Engineer shall be included for all Work being subjected to a formal Design Review.

The Lead Engineer's activities that require an assessment and evaluation for conformity to requirements of PPA Documents includes:

a. Design reports;
b. Analytical approach;
c. Details of Design Documents;
d. Construction Documents and Plans;

e. Effect of major temporary components on permanent components;

f. Field design changes;

g. Design approval for materials and procedures; and

h. Record Drawings for conformity with Final Design Documents, requirements of PPA Documents and Governmental Approvals, and the DQMP.

3.2.5 Engineer of Record

Each Developer-designated Design Unit shall be assigned an Engineer of Record, in accordance with applicable state laws and regulations. The Engineer of Record shall sign and seal design reports, Plans, and Project specifications for the assigned Design Unit(s). Engineers of Record shall be Registered Professional Engineers in the State of Indiana.

Engineers of Record shall be located in the Project Office as necessary to coordinate the Work on assigned Design Units and shall be present in the Project area for, and attend all Design Reviews for, assigned Design Unit(s).

3.2.6 Design Quality Manager

The Design Quality Manager is one of the Key Personnel specified. The DQM shall organizationally report to the Quality Manager and be functionally independent from the production of the Design Documents.

The DQM shall be in the Project Office as required throughout the design process and shall be present as required thereafter to manage design QA efforts related to design support during Construction Work, design changes, and the completion of Record Drawings.

A certification by the DQM shall be included for all Work being subjected to a formal Design Review.

The basis of the certification shall be an assessment and evaluation by the DQM that Developer's design QA and QC activities comply with the DQMP and requirements of the PPA Documents.

1. The DQM design QA responsibilities relate to the following:

   a. Design of permanent and major temporary components;

   b. Changes in design of permanent components; and

   c. Record Drawings.

2. The DQM responsibilities also include performance of the following activities:

   a. Identify and report Nonconforming Work;

   b. Track, monitor, and report on the status of outstanding design-related nonconformance reports; and

   c. Submit specified certificates (permanent components and major temporary components).

3.2.7 Check by the Designer

The requirement that Developer engage and use a DQM shall not relieve Developer from carrying out all the Design QC checks and reviews that are consistent with Good Industry Practice and that a professional and prudent designer would normally carry out on the type of Work that is actually being designed.

3.3 Design Units

All design, drawings, and other related documents for the Work shall be packaged into separate Design Units. A written Design Unit Report identifying each Design Unit shall be submitted to IFA for review and comment in accordance with the required schedule of submittals described in Section 20. Each Design Unit shall consist of similar and coherent significant parts of the Project that can be checked and reviewed as a self-contained package with due consideration for accommodating interfaces with other project components.

The Design Unit Report shall include:

1. Design Unit description, including the scope of the Design Work within each Design Unit, including limits and interface points;
2. Planned review stages and dates, including specific information to be reviewed, review dates (measured from NTP1 date) specified in the PPA Documents, and percent complete represented by each review;
3. Engineer of Record; and
4. Locations where Design Work will be performed.

The monthly Progress Report described in Section 1 shall include any revisions to the information previously provided.

3.4 Relationship of Early Construction Starts to Design Development and Review

It is the intent of IFA to allow Construction Work to begin on a Design Unit prior to IFA's review and comment on the Final Design. Construction Work on any Design Unit, or component thereof, may begin at any time after the applicable Released-for-Construction (RFC) Design Review. Construction may progress in increments determined by Developer prior to Final Design, at Developer's risk, provided each increment of construction is covered by Plans and Construction Documents that have been reviewed by IFA and meet the requirements for Released-for-Construction.

3.5 Schedule for Design Checks, Design Reviews, and Submission of Checked Design

Developer is responsible for scheduling and conducting design checks and Design Reviews to meet the design and construction needs of the Project Schedule. The Design Review process and the frequency, duration, and intensity of Design Reviews may vary with the complexity of the individual Design Units and the associated construction activities. The duration of typical

Design Reviews shall be 15 days, unless otherwise agreed to by IFA during the Design Workshop described in Section 3.16. Design Reviews will be completed within 10 days for the following Work:

1. Local access roads and improvements associated with That Road
2. Overpass and local road improvements associated with Rockport Road

A written notice of scheduled Design Reviews shall be submitted to IFA at least one week prior to any review.

The Project Schedule shall include the agreed-upon Design Review Plan and Schedule for all Design Units, including their components, design safety assessment, and elements. A review of the Design Review Plan and Schedule shall be performed jointly by IFA and Developer each month.

Design Documents that are to be reviewed during Design Reviews shall be submitted with sufficient copies, as defined in the Design Review Plan and Schedule, to accommodate all participants in the Design Review. The documents shall be assembled for review in the Project Office, provided, however, that Record Drawings may be produced elsewhere.

Only Design Documents that have been QC checked shall be submitted for Design Review. No Design Documents shall be submitted for Design Review prior to approval of the DQMP. Design Documents shall be complete for each Design Unit, but may be combined for multiple Design Units at any one time upon IFA's written concurrence. A portion of a Design Unit may be reviewed where that portion has been identified for RFC. The Project Baseline Schedule shall include a review of each Design Unit for consultation and written comment.

For each Design Unit designated by Developer, Developer shall include design checks and Design Reviews as indicated in Table 3-1, and such additional reviews as may arise as indicated in Section 3.12.2.4. Time for IFA's participation and input to any design check conducted by Developer's DQM shall be allowed for in the Design Review Plan and Schedule. The Design Review schedule shall be incorporated into Developer's Project Schedule and report progress and updates in the monthly Progress Reports. The weekly progress meetings shall include an update to IFA on the exact timing of Design Reviews.

3.6 Revisions to Design

Any changes to design initiated by Developer, but not IFA, and already checked by the Designer and certified by the DQM shall be considered as an entirely new design. Such circumstances shall not form the basis of a Relief Event or otherwise entitle Developer to additional compensation or a time extension.

3.7 Design Review Plan and Schedule

A Design Review Plan and Schedule shall be submitted to IFA for review and comment in accordance with the required schedule of submittals described in Section 20. The Design Review Plan and Schedule shall be a component of the DQMP and shall address design stages, plan completeness, and the design QA/QC process, for each Design Unit. The Design Review Plan and Schedule shall describe the level of design that the Designer is to accomplish for each of the planned stages of design development and provide a description and checklist

for each Design Unit that clearly identifies the Design Documents that will be reviewed. The Design Review Plan and Schedule shall include review times for each design check and Design Review, including the review dates and durations for IFA, unless noted otherwise in the Technical Provisions or otherwise agreed to by IFA at the Design Workshop.

3.8 Stages of Design Development

The Design Review Plan and Schedule shall define a design check and Design Review for each Design Unit at each Developer defined stage of design development specified herein, as proposed by Developer, and agreed to in the Design Workshop. The following are the six stages of design development:

1. Stage 1 Design;
2. Stage 2 Design (as needed);
3. Released-for-Construction;
4. Final Design;
5. Working drawings; and
6. Record Drawings.

Design Units that are smaller and less complicated need only have Stage 1 review prior to RFC review.

Developer's design check and IFA's Design Review at each stage of design development shall accomplish the following, but does not constitute approval by IFA:

a. Verify that the Design Documents and Construction Documents comply with the requirements of the PPA Documents;

b. Allow components of Design Units to be Released-for-Construction; or,

c. In the case of reviews of working drawings, allow construction to continue.

3.9 Design Reviews

Except as mutually agreed upon by Developer and IFA, all Design Reviews shall be conducted in the Project Office. IFA will provide Design Reviews for Stage 1, Stage 2 where applicable, RFC, and Final Design. Each of the Design Reviews (for each stage of design development) will consist of three phases.

- **Phase 1** - consists of informal, brief presentations (sometimes known as over-the-shoulder reviews) during the development of design at the review office by the Engineer of Record of the Design Unit being reviewed and other Developer staff. The presentations shall include an explanation of what component(s) are being reviewed, highlighting any critical points or other information that may be of particular interest to the review participants.
- **Phase 2** - consists of a period of more detailed review by the review participants. For minor items with little complexity, and although it is expected that most **Phase 2** reviews

will take place in the Project Office, **Phase 2** shall, as necessary, provide for review participants to take the review package to their own offices for further examination, particularly for complex and, sensitive features. During this period, reviewers are encouraged to contact or meet with the Engineer of Record to gain further understanding of the design intent and discuss the reviewers' issues. The length of **Phase 2** shall be consistent with the durations agreed to at the Design Workshop or as subsequently agreed to in writing. IFA's **Phase 2** written comments, if any, will be provided to Developer within the periods specified in the PPA or as agreed to during the Design Workshop.

- **Phase 3** - consists of review participants meeting face to face with the Engineer of Record and other members of Developer's staff to present and resolve comments from review participants. **Phase 3** face–to-face comment resolution meetings may be waived as mutually agreed to between Developer and IFA.

3.9.1 Stage 1 Design Review

The Design Review of Stage 1 Design shall be the first Design Review after award and is intended to verify that the design concepts proposed by Developer meet the requirements of the PPA Documents. Submittal of Stage 1 design to IFA is for review and comment. The elements verified in the Stage 1 Design Review shall include:

1. The design concepts governing future Project design development are consistent with the requirements of the PPA Documents;
2. The design concepts are substantiated and justified by adequate Site investigation and analysis;
3. Final Project ROW requirements;
4. The Project Standards applicable to the proposed design concepts are identified and appropriate;
5. The proposed design concepts are constructable; and
6. That the design meets Project quality requirements and required procedures in the DQMP.

If the Stage 1 Design is revised subsequent to the Stage 1 Design Review, Developer shall recheck and recertify the design as an additional Stage 1 Design Review. Unless the revisions resulted from an IFA Change, such revisions will not form the basis of a Relief Event or otherwise entitle Developer to additional compensation or a time extension.

3.9.2 Stage 2 Design Review

Stage 2 Design Review may be performed at the discretion of Developer. Stage 2 Design Reviews are scheduled when the Design Work is sufficiently advanced from Stage 1 and in advance of RFC or Final Design to provide the opportunity to verify that the design is advancing per the requirements of the PPA documents, considering the type of design element.

Developer and IFA shall use the Stage 2 Design Review(s) to verify that the concepts and parameters established and represented by Stage 1 Design are being followed and that requirements of the PPA Documents continue to be met. Developer shall specifically highlight,

check, and bring to the attention of IFA in writing any changes to information presented at Stage 1 Design. The Stage 2 Design shall be submitted for review and comment by IFA.

3.9.3 Released-for-Construction Design Review

Developer and IFA shall use the Design Review(s) of Released-for-Construction (RFC) Design to verify that the concepts and parameters established and represented by Stage 1 Design and/or Stage 2 Design, as applicable, are being followed and that requirements of the PPA Documents continue to be met. Developer shall specifically highlight, check, and bring to the attention of IFA in writing any changes to information presented at Stage 1 Design and/or Stage 2 Design. The RFC design shall be submitted to IFA for review and comment. RFC Design Review may be conducted at any level of design of the Design Units, suitable to proceed to construction.

Developer shall not construct any permanent components or major temporary components until the design checks, Design Reviews, and DQM's certifications have been completed for the relevant Design Unit, or component thereof, and until any issues raised in IFA's review and comment on the Design have been resolved to IFA's satisfaction. Additionally, Developer shall not commence any construction until any design-related Nonconformance Reports have been addressed and resolved to IFA's satisfaction.

After completion of all such requirements, Developer's Lead Engineer shall stamp, sign, and date the Design Documents as Released-for-Construction certifying that all requirements of the PPA Documents have been satisfied. Subsequent revisions to RFC documents shall clearly indicate revisions and include a complete history of revisions since first issuance in the title block and shall follow the same Released-for-Construction Design Review process described in this Section 3.

3.9.4 Final Design Review

Developer shall schedule and perform a Final Design Review when the Design Documents and Construction Documents for a Design Unit are 100 percent complete. Developer shall specifically highlight, check, and bring to the attention of IFA in writing any changes to information presented at previous Design Reviews. The Final Design shall be submitted to IFA for review and comment.

3.10 Working Drawings

Construction Documents include working drawings which may include the supplemental design products listed below:

1. Construction details;
2. Erection plans;
3. Fabrication plans;
4. Field design change plans;
5. Stress sheets;
6. Shop plans;

7. Lift plans;
8. Bending diagrams for reinforcing steel;
9. Falsework plans;
10. Materials samples; and
11. Similar data required for the successful completion of the Work.

A QC check, review, and certification of working drawings prior to their being issued for construction shall be performed.

Working drawings shall be submitted to IFA for review and comment. IFA will provide comment on the working drawings within 14 days.

3.11 Record Drawings

Record Drawings for each Design Unit shall be submitted to IFA in accordance with the requirements of the PPA Documents.

Refer to Section 3.12.2.2 for additional requirements relating to Record Drawings and information.

3.12 Design Checks, Certifications, and Design Reviews

Developer shall ensure that the Designer's organization checks all Design Documents, including drawings, Plans, specifications, calculations, and reports, produced by Developer's organization. The DQM shall certify that these documents have been checked in accordance with the requirements of the PPA Documents and Developer's DQMP. The DQM's written certification shall provide the certification specified in Section 3.12.3.

Developer and IFA are to follow the process shown in Figure 3-1 for design checks conducted by Developer's DQM and IFA Design Reviews. This applies to all design checks and Design Reviews, with the exception of Record Drawing reviews.

Responses to and disposition of Nonconformance Reports shall be provided by Developer in a timely manner. IFA may also issue design Nonconformance Reports that shall be addressed and resolved in accordance with Section 3.1 of the PPA prior to releasing the design(s) for construction. IFA will close a Nonconformance Report only if the issue has been resolved or addressed to IFA's satisfaction, in accordance with the requirements of the PPA Documents.

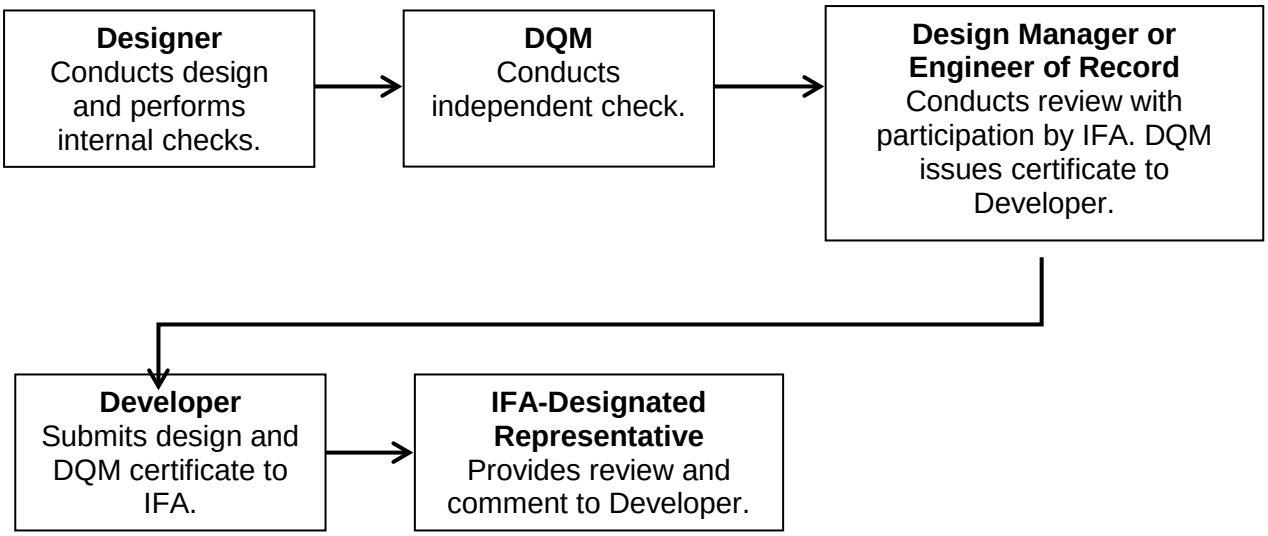

Figure 3-1 (Design Check/Review Flow Chart)

Developer and IFA are to follow the process shown in Figure 3-2 for Record Drawings being submitted for Design Review.

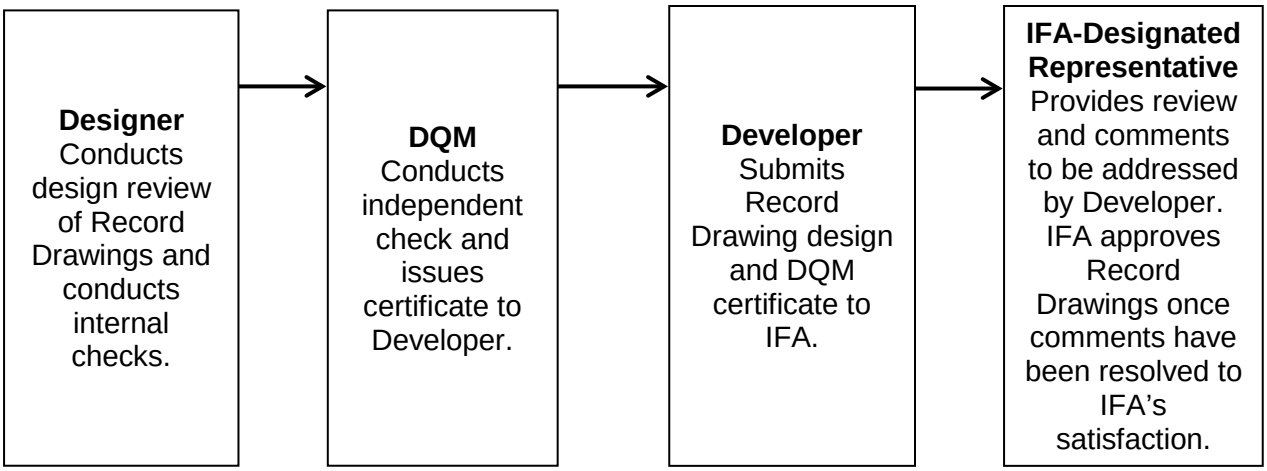

Figure 3-2 (Design Check/Review Flow Chart for Record Drawings)

Developer shall conduct and complete the design checks, certifications, and reviews for each Design Unit by the entity specified in the column entitled "Design Check and Certification to Developer" appearing in Table 3-1. Developer shall submit its design for Design Review in accordance with Table 3-1 supported by a written certification issued by the DQM, at the stages of design development shown in Table 3-1 for each Design Unit in accordance with the Design Review Plan and Schedule and the Project Baseline Schedule.

Table 3-1 Design Checks, Certifications, and Design Reviews for Permanent and Temporary Components

Stage of Design Development	Design Check and Certification to Developer	Design Review
Stage 1 Design	Designer and DQM	IFA and Designer
Stage 2 Design Review(s)	Designer and DQM	IFA and Designer
Released-for-Construction Design	Designer and DQM	IFA and Designer
Final Design	Designer and DQM	IFA and Designer
Working Drawings and Related Documents	Designer and DQM	IFA and Designer
Record Drawings	Designer and DQM	IFA
Major Temporary Components	Designer and DQM	IFA and Designer
Temporary Components	Designer and Checker	Not Applicable

3.12.1 Developer's Independent Design Checks

3.12.1.1 Design Assessment

Design assessment is the review of general compliance with the requirements of the PPA Documents, taking into consideration the proposed method of construction, and shall cover the following areas:

1. Loads;
2. Applicable Laws and Project Standards;
3. Methods of analysis;
4. Computer software and its validation;
5. Interface requirements;
6. Maintenance requirements;
7. Materials and material properties;
8. Durability requirements;
9. Fatigue performance;
10. Hydrology;
11. Design flows;
12. Governmental Approvals, requirements and conditions; and
13. Environmental commitments.

3.12.1.2 Analytical Check

The independent design check shall include an independent analytical check using separate calculations — and without reference to the Designer's calculations — to establish the structural adequacy and integrity of critical structural members. This check shall include, as a minimum, the following:

1. The structural geometry and modeling;
2. Material properties;
3. Member properties;
4. Loading intensities; and
5. Structural boundary conditions.

3.12.2 Design Reviews

3.12.2.1 Design Checks Conducted by Developer's DQM

Developer shall notify and invite IFA to participate in all design checks conducted by the DQM.

A design check report for each Design Unit checked by the DQM shall be submitted to IFA within 7 days of each design check. The design check reports shall identify any actions arising from the review. The design check shall include the items requiring corrective action through the issuance of a design Nonconformance Report. The DQM shall send the design Nonconformance Report to the Designer and a copy to IFA.

Design checks shall be conducted in the Project Office. The Engineer of Record and any specialists with significant input to the design or Design Review shall be present. All drawings, copies of calculations, reports, or other items pertinent to the design check in accordance with the Design Review Plan and Schedule shall be available during the check.

3.12.2.2 Record Drawing Review

The content of Record Drawings shall incorporate complete information that demonstrates that the Work as constructed meets the requirements of the PPA Documents.

Complete Record Drawings for each Design Unit shall be submitted to IFA for review and approval. All corrections noted in the review of Record Drawings shall be addressed and corrected. The approval of Record Drawings by IFA is a condition of Final Acceptance and will not occur until the Record Drawings are submitted, reviewed, and corrected to IFA's satisfaction.

3.12.2.3 Design Review of Major Temporary Components

The DQM shall conduct a design check of major temporary components that represent complex structures and that potentially can affect the safety, quality, and durability of the permanent components. The review shall include the effect of the major temporary components on the permanent components. Developer shall invite IFA to participate in the review.

3.12.2.4 Additional Reviews

IFA may conduct additional over-the shoulder reviews as considered necessary to ensure a continued and uniform consistency in the quality and effective incorporation of revisions to designs. Developer may also conduct reviews necessary to facilitate the early release of designs for construction.

3.12.3 Released for Construction

Construction of any element of the permanent components shall start only after occurrence of all of the following:

1. QC Check - The Designer has conducted its design QC checks throughout the design process in compliance with the DQMP and certifies, in writing, that the Design Document is complete to the appropriate level or stage of review, checked, and ready to be Released-for-Construction.

2. DQM Signature - The DQM has signed the title sheet for the drawings, certifying to the following (the title sheet can be formatted to include the items of certification):

    a. Design checks have been completed;

    b. Work conforms to requirements of the PPA Documents;

    c. Any Deviations or design exceptions have been approved, in writing, by IFA;

    d. Design QC activities followed Developer's DQMP; and

    e. All outstanding issues or comments from Design Reviews have been resolved to IFA's satisfaction.

3. Engineer of Record Signature - The Engineer of Record has signed all drawings prepared under their direction. For those drawings and documents included in the Submittal that are prepared by a manufacturer or Supplier or other persons not under the direct supervision of the Engineer of Record, the Engineer of Record shall affix a stamp that indicates the design shown on the sheet or Design Document conforms to the overall design and requirements of the PPA Documents.

4. Lead Engineer Review - The Lead Engineer has signed the title sheet to the drawings certifying to the items contained in Section 3.2.4. The title sheet can be formatted to include the items of certification.

5. Developer Verification - Developer has verified in writing the following:

    a. Design has undergone constructability review and is constructable as represented;

    b. Design Documents, Construction Documents, and related documents for the portion of the Project to be constructed are complete and checked;

    c. The design and drawings for maintenance of traffic and temporary erosion control and environmental measures applicable to the Work are complete;

    d. Adequate stakes, lines, and monuments necessary to control the Work have been established on the Site; and

e. Developer has addressed IFA-provided written comments regarding the Design Documents and applicable MOT plans, temporary erosion control measures, and environmental requirements to IFA's satisfaction.

6. Documents stamped RFC - Developer's Lead Engineer stamps the Design Documents as Released-for-Construction.

Any design Nonconformance Reports issued by the DQM or IFA shall be addressed and resolved by Developer, to the satisfaction of IFA prior to any design being Released-for-Construction.

3.12.4 Detected Nonconformances and Comment Resolution

IFA comments and detected Nonconforming Work from Design Reviews will be recorded and transmitted to Developer. Proposed disposition and response to each detected Nonconformance and comment shall be recorded and reviewed with IFA to resolve outstanding detected Nonconformances, comments, and dispositions. Final disposition and resolution shall be documented by Developer within an IFA-provided database application.

All Design Reviews shall include a comment and Nonconformance Report resolution process where unresolved comments and Nonconformance Reports are discussed and a written action plan and schedule for the resolution of unresolved comments are presented in accordance with Section 3.1 of the PPA. The DQM shall lead this process.

3.13 Design Exceptions

All requests for design Deviations or design exceptions from Project Standards shall be submitted to IFA for review and approval in accordance with the IDM. Requests for design Deviation or design exception shall include a justification report detailing the reasons to retain a nonstandard or substandard feature or for providing an improvement that does not bring the feature up to standard. Requests for design Deviations and design exceptions shall be submitted not later than the Stage 1 Design Review. Approval of Deviations and design exceptions by IFA, in writing, shall be obtained before the affected Design Units can be Released-for-Construction.

3.14 Design Changes Prior to Construction

Design changes may occur prior to commencement of Construction Work and may be initiated by Developer or IFA.

A check of all calculations related to design changes requiring calculations shall be performed and documented by the Designer and the DQM. All design changes requiring the alteration of RFC Documents require all review procedures included for original Design Documents in Developer's DQMP and Section 3.12 to be performed.

3.15 Design Support During Construction

The Lead Engineer and Construction Quality Manager shall verify, during Construction Work, that the conditions actually encountered are consistent with the design and related Design Documents and Construction Documents. The Designer shall prepare necessary adjustments to

the Design Documents and Construction Documents and shall submit to IFA for review and comment on any such design changes. The Designer and DQM shall check any such changes in accordance with the DQMP. A certification that the change meets the requirements of the PPA Documents shall be produced by the DQM and submitted to IFA. Developer shall incorporate the adjustments in the Record Drawings.

3.16 Design Workshop

A Design Workshop shall be planned and scheduled before Design Work commences. A draft schedule and agenda shall be submitted to IFA for review and comment prior to the Design Workshop. The goal of the Design Workshop is to familiarize the Designer's personnel and IFA review personnel with the design concepts, issues, status, and review procedures; with the intent of making the subsequent Design Reviews more effective and efficient for all parties. The agenda of the Design Workshop and how it is be organized (e.g., by Design Unit and engineering discipline) shall be jointly developed by IFA and Developer.

At the Design Workshop, an agreement regarding time provided in the schedule for Design Reviews shall be established. The duration of Design Reviews, particularly the duration of Phase 2, may vary depending on items such as the stage of the design development, the size of the review package, the complexity of the subject for review, potential environmental implications, public safety concerns, and the need for third-party review. The agenda shall include time for a discussion of the necessary Environmental Approvals, permitting processes, review times, and strategy for the mitigation of potential delays. These issues and specified review times shall be considered within the Project Baseline Schedule.

All agreements, schedules, and understandings reached during the Design Workshop shall be documented, and submitted for approval by Developer's Authorized Representative and IFA.

3.17 Quantity Estimates

A quantity estimate of material included in each Design Unit shall be included in each package submitted for RFC. The material quantities shall align to a detailed schedule of pay items in a format acceptable to IFA. The estimated quantities are to facilitate determining QC and QA sampling and testing frequencies.

3.18 Design Documentation

3.18.1 Progress Tracking

The status of engineering and design progress and any design change work shall be included in the Project Status Schedule.

3.18.2 Design Quality Records

A Design Monitoring Report shall be submitted monthly to IFA. The report shall be prepared by the DQM and include all design issues and review comments resulting from the scheduled Design Reviews and additional checks and reviews, including over-the-shoulder reviews.

A record of all DQMP procedures, reviews, and checks shall be maintained and available for IFA audit. Developer shall perform verification sampling of quality assurance's documentation to determine if all procedures included in the DQMP have been followed.

Reports of design checks and reviews shall be submitted to IFA within seven days of the completion of the review.

A log of design Nonconformance Reports and notices shall be maintained and available for IFA audit. The log shall include the dates issued, reasons, their status, or their resolution and the date of resolution.

Daily records of design activities shall be maintained and available for IFA audit. The daily records shall be on forms acceptable to IFA.

3.18.3 Progress Report

The following information shall be included in the Progress Report submitted to IFA monthly in accordance with Section 1.5.2.1.3:

1. Summary of reviews conducted;
2. Nonconforming Work and current status and disposition, based on design nonconformance log; and
3. Submission(s) from Developer and status.

3.19 Design Documents and Construction Documents

During the design process, Developer shall develop Design Documents and Construction Documents in accordance with the PPA Documents that are applicable to the specific materials, products, equipment, procedures, and methods that Developer intends to use.

3.19.1 Plans

The Work shall be performed in accordance with the details as shown on the Design Documents and Construction Documents. It is Developer's responsibility to provide Construction Documents of such a nature as to develop a finished product in accordance with Design Documents and requirements of the PPA Documents. Developer shall verify pertinent dimensions in the field prior to conducting a Design Review. Participation in the review of Developer's Design Documents and Construction Documents by IFA will not relieve Developer of the responsibility for the satisfactory completion of the Work.

Construction Documents shall be reviewed and approved, in writing, by the Designer before beginning the Construction Work and shall not be amended or altered without prior written approval of the Designer and IFA's review and comment.

All Released-for-Construction Designs, Final Designs, and Record Drawings shall be signed and stamped/sealed by the appropriate Engineer of Record. The title sheet for the plans shall include the certification signatures of the Lead Engineer and the DQM (the title sheet can be formatted to cite the appropriate certification requirements of Sections 3.2.4 and 3.12.3.

3.19.2 Design and Record Drawings Format and Organization

Project CADD Drafting Standards shall be established at the Design Workshop.

All Plans submitted for review shall include relevant reference files and information, to include proposed Project ROW, property lines for adjacent properties, limit of disturbance, environmental features, and other information necessary to facilitate the full and complete review of the Plan, as well as support other Project efforts, including coordination with third parties, Governmental Entities, and public outreach.

The digital format of Plans submitted for any purpose, shall be in PDF format of a sufficient resolution and clarity to allow full-size printing, with accurate scale, that is indistinguishable in quality from a traditional mylar print. Developer is advised that scanning to PDF format using a standard multi-function copier will generally not meet this requirement.

The format of revisions to RFC Documents shall be using redline format. Modifications to RFC Documents shall be shown in red and noted with a revision number near the revision and in the revision block.

Digital design files submitted for review shall be in .DGN format, as agreed upon by the Parties or as requested by IFA.

A conformed plan set of RFC Documents shall be available to IFA in PDF format at all times. The conformed plan set shall be formatted and organized into a single, indexed, and well-organized set of RFC Documents. This conformed plan set shall include plan revisions made during Construction Work and Record Drawings.

3.19.3 CADD Standards

CADD formatting for Design Documents and Record Drawings shall conform to Developer's CADD Drafting Standards.

3.19.4 Special Provisions

Special Provisions based on the requirements of the PPA Documents shall be prepared and submitted to IFA for review and approval during the applicable Design Reviews.

Developer may perform the following activities:

1. Use Department's Standard Specifications and Recurring Special Provisions as supplemented by the PPA Documents; and
2. Prepare Special Provisions to the Standard Specifications.

Special Provisions, including Special Provisions to the Standard Specifications and Recurring Special Provisions, shall provide a level of quality that meets or exceeds the requirements of the PPA Documents. Special Provisions shall be suitable and appropriate to control the Work. Developer shall be responsible for demonstrating that the Special Provisions meet or exceed the standard of quality required by the PPA Documents.

The Special Provisions shall define the type and frequency of QC sampling and testing to be conducted for the Work covered by a Special Provision. Use the Department's "*Manual for Frequency of Sampling and Testing and Basis for Use of Materials*" as specified in Section 4.

4 CONSTRUCTION QUALITY ASSURANCE, QUALITY CONTROL, AND OVERSIGHT

4.1 Developer Construction Responsibilities

Construction Work shall be performed in accordance with the requirements of the PPA Documents, Good Industry Practice, Governmental Approvals, Laws, Final Design Documents, Construction Documents, and the approved PMP and components thereof.

A Construction Quality Management Plan (CQMP) for the Construction Work is a component of the QMP and a sub-component of the PMP. Developer, through the CQMP, shall have responsibility for the quality of the Work, including all Work and products of Contractors, fabricators, Suppliers, and vendors, both on- and off-Site. The IFA, in its Oversight role, through verification and validation, will conduct verification Oversight inspections, audits, sampling, and testing. The Developer is responsible for performing all Construction QC inspection and testing. The Developer is also responsible for establishing an overall Project Quality Assurance (QA) program. IFA staff will serve in an Oversight role, but will have an internal QA program to fulfill needs of the IFA.

The CQMP shall describe how procurement, shipping, handling, fabrication, installation, cleaning, inspection, construction, testing, storage, examination, repair, maintenance, and required modifications of all materials, equipment, and elements of the Work will comply with the requirements of the PPA Documents, and that all materials incorporated in the Work and all equipment and all elements of the Work will perform satisfactorily for the purpose intended.

4.1.1 Construction Quality Control Inspection

All construction processes, procedures, and workmanship shall be inspected by Developer's construction quality control inspectors. Prior to starting major work activities, a work plan shall be prepared and discussed with Developer's production staff and quality verification staff to ensure all involved are building quality into their work. Each work plan shall be prepared at a level of detail to ensure that all Work is completed in conformance with the PPA Documents. The construction quality control inspections and material sampling shall include the requirements, observations, measurements, and documentation specified in the Department's current Office of Materials Management (OMM) Manual for Frequency of Sampling and Testing and Basis for Use of Materials (Frequency Guide), and included in Developer's CQMP. Inspection observations, measurements, results, non-conformances, and corrective actions shall be documented on Department standard forms or on Developer forms accepted by IFA. Each completed inspection observation and documentation form shall include a description of construction activity and location arranged by the Department's Standard Specification section.

Construction QC inspection and documentation shall be performed in compliance with those documents and standards included in the Project Standards that are published, issued, or maintained by the Department.

4.2 Inspection and Testing of Materials

4.2.1 General

All materials are subject to inspection, sampling, and testing by the IFA at any time before Final Acceptance.

References in the PPA Documents to Department test methods or test designations of the American Association of State Highway and Transportation Officials, the American Society for Testing and Materials, or any other recognized national organization will mean the latest revision of that test method or specification for the Work in effect on the Setting Date.

Materials shall be sampled and tested by the construction QC testers and samplers. Results of all test results shall be available to Developer's Project Manager, the Construction Quality Manager, and the Lead Engineer. When a test is done for Developer as process control, ensuring that its process and materials source is producing an acceptable product, test results are not furnished to the above-stated individuals, but are internal Developer documents.

IFA may observe any sampling testing performed by the QC testers and samplers. If IFA observes a deviation from the specified sampling or testing procedures, IFA will verbally describe the observed Deviation to Developer's Quality Manager, followed by a written Nonconformance Report addressing the Deviation to Developer's Quality Manager and Project Manager within 24 hours.

4.2.2 Construction Quality Control Testing and Sampling

The results of QC sampling and testing shall be recorded on Department standard forms or on similar forms acceptable to IFA and may be used in IFA's approval decision. Construction QC testers and samplers shall be certified to the level appropriate for the Work being sampled/tested. A list of construction QC testers and samplers shall be maintained and available for IFA audit at all times. The list shall indicate what test certifications each person currently holds. Testers and samplers are to be certified prior to performing any work on the Project.

The construction QC testers and samplers shall test and sample only those materials for which they are certified to sample and test. The results of each test shall be recorded on the form prescribed for that test. A log of all tests that do not pass specified requirements shall be maintained and available for IFA audit at all times. Each failed test on the log shall be reconciled by a subsequent passing test, as required by the specifications.

4.3 Quality Assurance Oversight

4.3.1 IFA Quality Oversight

The IFA Quality Oversight will include periodically auditing Developer QC and QA activities, including conducting independent verification sampling and testing. The audits, test results, and subsequent feedback to Developer are intended to assess the adequacy of Developer's QC and QA efforts, including the frequency of testing.

IFA will provide Developer the ability to use and access the database application used to capture observations made during IFA Quality Oversight activities. Observations will be

identified either as conforming or nonconforming to related requirements of the PPA Documents. Observations will be presented to Developer through IFA Quality Oversight Verification Reports. Developer shall respond to all detected instances of Nonconforming Work using IFA's database application. A construction Nonconformance Report will be closed by IFA upon the verification of a resolution of the issue acceptable to IFA in accordance with the requirements of the PPA Documents.

Developer's Project Manager shall provide information to IFA's Quality Oversight Manager regarding activities that are completed per Developer's Project Schedule and available for verification.

Verification sampling and testing will be performed by IFA on samples taken independently of QC samples.

4.3.2 Independent Assurance

IFA will provide, periodically, independent assurance to evaluate Developer's qualified sampling and testing personnel and testing equipment. The independent assurance program will evaluate the sampling and testing procedures, and testing equipment used by Developer's construction quality control staff, IFA's quality staff, and the independent referee laboratory.

4.3.3 Quality Check Points

Quality control checkpoints (QCPs) shall be established at stages of the construction progress to ensure Work is performed in accordance with Developer's CQMP and within the terms and conditions of the Project. As Work is accomplished, Developer's Quality Manager and Lead Engineer shall meet with the IFA to review documentation and procedures for QC and QA, including material certifications, daily inspection records, material testing results, survey results, permits, and material placement records. Developer's Quality Manager shall coordinate attendance at scheduled QCPs to ensure that QCPs are accomplished in a timely manner so that Developer is not delayed. When an identified QCP has been reached and when notified by the Quality Manager, IFA will respond within four working hours to verify whether Work has been completed for the checkpoint. Notification to IFA that a QCP has been reached while Work is still being performed or not allowing adequate time to complete the QCP review and opportunity for adjustments (e.g., concrete trucks are queuing while reinforcement is still being placed and QCP is being reviewed for a specified unit) will result in the issuance of a Nonconformance Report.

Scheduling and conducting a QCP shall occur at the following stages of construction:

1. Environmental:
    a. After the establishment of erosion and sediment control measures for defined earth disturbance area; and
    b. At the end of each month to review weekly and post-storm inspections.
2. Embankments:
    a. After the completion of drainage and Utility Adjustments and prior to backfill;
    b. After clearing, grubbing, and excavation to check subgrade;

c. Per specifications for lift requirements at 5-foot intervals of embankment construction;

d. After the completion of mechanically stabilized earth wall panel placement; and

e. At the completion of embankment placement to establish the settlement monitoring baseline.

3. Structures:

a. At the completion of placement for bridge deck reinforcement and prior to the placement of concrete;

b. At the completion of placement for abutment wall reinforcement and prior to the placement of concrete;

c. After the completion of pile-driving at each structure support, including pile-driving results and records;

d. At the completion of placement for footing reinforcement steel and prior to the placement of concrete;

e. At the completion of excavation for drilled shaft foundations and prior to concrete placement;

f. After setting rails for screed machine and prior to placing concrete overlays;

g. After the completion of the first component to receive specified aesthetic wall treatment/form liner and prior to proceeding with the construction of subsequent components; and

h. After the completion of every 500 feet of noise wall posts and panels.

4. Utilities:

a. After the installation of direct-burial duct banks and prior to backfill operations;

b. For concrete-encased duct banks, after the installation of conduits and prior to the placement of concrete; and

c. For all utility lines intended to transport pressurized materials and lines intended to carry liquids, after the installation and prior to the completion of pressure testing.

5. Paving and sidewalks:

a. Before the placement of each course above subgrade on permanent roadway components;

b. Before the placement of each lift of asphalt or Portland cement concrete; and

c. Prior to the placement of concrete for sidewalks.

4.4 Independent Referee Laboratory

IFA will retain, subject to the Party's payment obligations set forth in this Section 4.4, the services of an independent Department approved laboratory on an on-call basis to act as a

referee laboratory for the resolution of disputes regarding sampling and testing results reported by IFA's verification samplers and testers and Developer's construction QC testers and samplers. The referee laboratory will not be the Department's Office of Materials Management laboratory. The services of the referee laboratory may be requested by IFA or by Developer. The sampling and testing results determined by the referee laboratory will be final and binding for both Parties and not subject to the Disputes Resolution Procedures. The Party whose sampling and testing results are not confirmed and supported by the referee laboratory, such as the unsuccessful Party, will be responsible for payment for the referee services. If IFA is the unsuccessful Party, it will make payment directly to the referee laboratory. If Developer is the unsuccessful Party, the cost of the referee laboratory services will be invoiced directly to Developer and IFA will make payment to the referee laboratory on behalf of Developer.

The independent referee laboratory will not be associated with the Project in any capacity or be affiliated with any Party, the Department, or with any Developer-Related Entities. The independent referee laboratory will not be a department, agency, or office of any Project participant.

4.5 Material Testing Process

Developer's construction QC staff shall inspect, sample, test, and accept or reject materials in accordance with the approved CQMP and consistent with the Department's Frequency Manual. Refer to the Department's Standard Specifications Section 106 regarding the approval of materials. All results of all QC testing, including failing test results shall be submitted to IFA for review and statistical comparison with verification sampling and testing. Materials determined by Developer QC to be noncompliant shall be rejected. Discrepancies of allowable tolerances between the IFA's verification testing and the Engineer may be forwarded to the independent referee laboratory for determination at the request of Developer. Materials that are mutually agreed upon as noncompliant, or are determined by the independent referee laboratory to be not in compliance with the Specifications, shall be assigned a Nonconformance Report and tracked separately until satisfactorily disposed of.

If material is rejected by Developer based on the failing test data, the test data representing the rejected lots of material is to be excluded from comparison.

4.6 Competence

If an IFA concern arises as to the competence of any certified individual, IFA's concern will be documented, and communicated to Developer's Quality Manager. The concern shall be investigated as deemed necessary by the Lead Engineer. If this investigation substantiates the concern, corrective action or decertification shall be implemented in accordance with procedures established by IFA.

4.7 Developer Quality Control

Developer shall provide process control measures adequate to produce a constructed product of acceptable quality that conforms to the requirements of the PPA Documents. Developer shall perform process control sampling, testing, and inspection during all phases of the Work at a rate sufficient to ensure that the Work conforms to the requirements of the PPA Documents.

Developer shall provide personnel and equipment capable of providing Work that conforms to specified requirements and shall provide personnel and equipment capable of confirming and documenting performance. The continual production of Nonconforming Work will not be allowed.

Materials and products determined deficient shall be brought into compliance with the PPA Documents or replaced. Refer to the requirements of the PPA Documents for the resolution of unacceptable materials. The log of failed tests shall include the method of reconciliation.

4.8 Developer's Construction Quality Control Organization

The CQMP shall provide information regarding Developer's construction QC and QA organization.

4.8.1 Construction Quality Manager

Developer shall assign an on-Site Construction Quality Manager. This individual will be considered one of Developer's Key Personnel and is responsible for Construction QA. Developer shall also assign an on-Site Construction Quality Control Manager (CQCM) who will also be considered one of Developer's Key Personnel and is responsible for construction inspection and QC sampling and testing activities ("Construction Quality Control Manager (CQCM)").

Developer's Construction Quality Manager shall be responsible for the overall management and supervision of Developer's construction quality programs. Developer's Construction Quality Manager shall be a Registered Professional Engineer licensed in the state of Indiana. Developer's Construction Quality Manager shall report directly to Developer's Quality Manager.

Developer's Construction Quality Manager, or its designees, shall be delegated the authority to make needed improvements to the quality of Work, including the suspension of the Work, if required.

Developer's CQCM shall be responsible for coordinating the schedules of Developer's construction QC inspectors and construction QC testers and samplers with Developer's construction activities so as not to delay Developer's operations due to construction QC inspection, sampling, and testing activities.

4.8.2 Staffing Levels

The actual staffing level of the field/Site QC staff shall reflect the complexity, needs, shifts, and composition of QC activities, consistent with Work in progress.

Developer's CQMP shall identify administrative and clerical support for the maintenance and management of records and documents pertinent to QC activities.

The QC staffing schedule shall be updated, as necessary, throughout the Term of the PPA to reflect an accurate forecasting of QC staffing requirements.

4.8.3 Laboratories

Laboratory QC testing shall be conducted by testing laboratories, retained by Developer under subcontract, that comply with the requirements for Department certification for applicable tests. Laboratories are to be accredited by the AASHTO Material Reference Laboratory, the Concrete Cement Reference Laboratory, the National Precast Concrete Association for precasters, or the Prestressed Concrete Institute, as appropriate, for the Work to be constructed.

Department certification shall be obtained for all AASHTO and ASTM test methods to be performed by the testing laboratory. Certification shall also be obtained for AASHTO and ASTM test methods that are modified or referenced by IFA test methods.

Satellites (field laboratories) of these laboratories may be used where appropriate for the tests being conducted. The equipment in the satellite laboratories shall be certified at the start of Work and annually thereafter. Certification shall be performed by an independent AASHTO-accredited laboratory or AMRL inspector.

The laboratory shall have written policies and procedures to ensure portable and satellite laboratories performing testing activities on the project are capable of providing testing services in compliance with applicable test methods. The policies and procedures are to address the inspection and calibration of testing equipment, as well as a correlation testing program between the accredited laboratory and portable or satellite facilities.

IFA reserves the right to check testing equipment for compliance with specified standards and to check testing procedures and techniques.

IFA also reserves the right to access the testing facilities of the testing laboratories — with no additional cost to IFA — to witness the testing and verify compliance of the testing procedures, testing techniques, and test results.

IFA's rights to check equipment, procedures, and techniques and to access testing facilities will also apply to Utility Companies when Developer is performing Work on their facilities.

4.9 Developer Scheduling and Notice to IFA

A Construction Work Activity schedule shall be submitted to the IFA by 12:00 noon (Project Office time) on Friday of each week. The Construction Work activities schedule shall include all planned construction work activity including fabrication, for the upcoming two weeks to allow IFA to schedule its oversight resources. This two week schedule of planned construction work activities is also to be discussed at the weekly coordination meeting in order to allow timely coordination of inspection activities. For activities, such as fabrication, occurring out of the immediate Project area, or beyond 100 miles of the Project, Developer shall give IFA at least 21 days of notice of planned Work.

4.10 Documentation

Documentation of progress and observed performance shall be prepared, collected and preserved during Developer's performance of the Construction Work. The documentation shall be in a digital format acceptable to IFA. Documentation shall include:

1. Daily inspection reports;

2. Record Drawings;
3. Secure databases, such as spreadsheets, standard database software, and computation books;
4. Materials approval records;
5. Photographs; and
6. Field change sheets.

Daily manpower and equipment reports for Developer and each Contractor for Construction Work activities shall be prepared, collected and maintained by Developer using the standard Department forms or other forms with a format acceptable to IFA.

A daily log for Construction Work activities shall be prepared and maintained by Developer's Project Manager or their designee(s). The daily log shall contain all significant occurrences on the Project in a narrative form, including unusual weather, asserted occurrences, events, and conditions causing or threatening to cause any significant delay or disruption or interference with the progress of any of the Work, significant injuries to person or property, and a listing of each activity depicted on the current monthly plan update that is being actively prosecuted. The log is also to contain, in the Project area, traffic accidents and lane Closures in effect at the time of the accident.

For Utility-related activities, such data shall be maintained separately in a log for each Utility facility.

For Hazardous Materials Management, such data shall be maintained separately in a log for each Site.

Performance records shall document all QC operations, inspections, activities, and tests performed, including the Work of Contractors. Developer may use the forms provided by IFA or its own forms providing equivalent information. Such records are to include any delays encountered and Work noted that does not conform to the requirements of the PPA Documents or design together with the corrective actions taken regarding such Work.

Documentation shall be completed and submitted at the following times and frequencies:

1. Monthly – summary report of progress and summary analysis of QC and QA efforts.
2. Weekly –submit records that include factual evidence that required activities or tests have been performed, including the following:
    a. Type, number, and results of QC and QA activities, including reviews, inspections, tests, audits, monitoring of Work performance, and materials analysis;
    b. Closely related data, such as the qualifications of new QC or QA personnel on the project, new procedures implement, and new equipment used;
    c. The identity of Developer's QC inspector or data recorder, the type of test or observation employed, the results and the acceptability of the Work, and action taken in connection with any deficiencies noted;
    d. Nature of Nonconforming Work and causes for rejection;

e. Proposed corrective action;

f. Corrective actions taken; and

g. Results of corrective actions.

4.11 Material Certifications

Developer shall present information regarding the fabricators of any fabricated structural steel, other metal fabricated structural members and prestressed/precast structural members to IFA as soon as it is known. Copies of documentation for all sources of supply shall be provided as soon as they are known, but are to be provided to IFA no less than 30 days prior to delivery to the Project.

Developer shall use the Department's list of qualified manufactures, producers, and fabricators for the specified materials, unless otherwise approved by the IFA at its sole and reasonable discretion.

When Developer purchases materials from Suppliers shown on the Department's approved materials or source list, Developer shall be provided a materials certification, or a certificate of delivery, certificate of analysis, or certificate of compliance, as required, from the supplier that covers the materials and the source. All documentary evidence that materials and equipment conform to the procurement requirements shall be submitted to the IFA or its representative, at the same time Developer receives such documentary evidence. If Developer wishes to purchase materials from a Supplier not shown on the list of qualified manufacturers Developer must submit a request to the IFA for its sole discretionary approval.

Documentary evidence that materials and equipment conform to the procurement requirements are to be available at the jobsite no less than 24 hours prior to installation or the use of such materials and equipment. This documentary evidence shall be retained at the jobsite and be sufficient to identify that the specific requirements, such as Construction Documents, Project Standards, and applicable Laws, are fulfilled by the purchased materials and equipment. The substitution of specified materials is not to occur without prior approval by Developer's Lead Engineer. Failure to acquire prior substitution approval will result in the assignment of a Nonconformance Report. The effectiveness of the QC by Developer's own forces and Contractors shall be assessed by Developer's Construction Quality Manager at intervals consistent with the importance, complexity, and quantity of the product or services. IFA reserves the right to audit and review these documents at any time.

Prior to Final Acceptance of the Project, a certificate of compliance shall be submitted to the IFA. The certificate of compliance shall be signed by Developer's Project Manager, Lead Engineer and Construction Quality Manager indicating that all materials incorporated in the Project conform to the requirements of the PPA Documents.

4.12 Construction Quality Control for Final Acceptance

IFA will determine when Developer achieves Final Acceptance pursuant to Section 5.8.5 of the PPA. Developer shall complete all Work and provide all documents, certifications, and other information in accordance with the requirements of the PPA Documents.

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5 AESTHETICS AND LANDSCAPE ARCHITECTURE

5.1 General

Developer shall design and construct landscape architecture elements and plantings associated with the Project in accordance with this Section 5 and the PPA Documents.

5.1.1 Landscaping and Aesthetic Work Allowance

An allowance has been established for a portion of the requirements specified in this Section 5, as further described in Section 5.10 of the PPA. The Landscaping Work Allowance shall be used for elements including:

1. Unified corridor bridge enhancements for: SR46 Bridge, Walnut Street Bridge, 3rd Street Bridge, 2nd Street Bridge, Tapp Road Bridge, Fullerton Pike Bridge, and Sample Road Bridge as described in Attachment 5-1 (Conceptual Aesthetic and Landscape Plans), including the following:

- Enhanced architectural railings for bridges with sidewalks
- Community identifiers - architectural letters identifying counties (e.g., Monroe), cities (e.g., Bloomington, Ellettsville), and universities (e.g., Indiana University)
- Use of Indiana Limestone veneer/texture/shapes and color in bridge elements, abutments and retaining walls
- Ornamental lighting for bridges with sidewalks and with coordination and approvals with/from local municipalities/ jurisdictions

2. Other corridor bridges – design elements related to bridge enhancements noted in this Section 5

- Consistent colors, textures, patterns, and coatings

3. Feature landscaping for the SR46 interchange transition to SR45/46 bypass and the I-69/SR46 interchange as described in Attachment 5-1 (Conceptual Aesthetic and Landscape Plans), including the following:

- Large native shade trees
- Native plantings – flowing masses/drifts of varied height, color, texture, and scale
- Native wildflowers/ grasses
- Use of limestone block retaining walls
- Placeholders for future markers/sculpture

4. Enhanced corridor/ median plantings

5. Architectural/artistic noise barriers as shown in Attachment 5-2 (Noise Barriers)

The following items are considered standard landscaping or aesthetic treatments and are not included in the Landscaping Work Allowance, but shall be a part of Developer's Work for the entire Project, as required in the applicable PPA Documents:

- Earthwork, topsoil, seeding, sodding, erosion control
- Standard lighting fixtures
- Standard traffic and pedestrian railings

- Standard bridge painting and surface sealing – emphasis on warm, natural colors
- Standard noise barriers
- Revegetation as specified by the Hoosier Heritage Roadside Program
- Reforestation as specified in Section 7.5.2

5.2 Standards and References

Developer shall perform the Aesthetic and Landscape Architecture Work in accordance with the applicable requirements of the PPA Documents, including Project Standards and this Section 5, Governmental Approvals, and applicable Laws.

5.3 Aesthetic and Landscape Concept Development

5.3.1 Aesthetic and Enhancement Implementation Plan

Developer shall prepare and submit an Aesthetics and Enhancement Implementation Plan (AEIP). Developer shall employ context sensitive solutions for all aesthetics and landscape work. The AEIP shall be reviewed and approved by the IFA.

Aesthetic and landscape elements of the AEIP shall include the following, at a minimum:

1. Bridges -- including pier details, parapet details, texture, and color of fence, concrete sealers for parapet/superstructure/piers/abutments, and painted steel surfaces
2. Bicycle and pedestrian facilities
3. Contour grading
4. Retaining structures – texture, color, architectural details
5. Fall Hazard Protection
6. Slope protection
7. Vegetation
8. Gateways
9. Street lighting
10. Traffic signal mast arms
11. Project ROW and stormwater facility fencing and screening
12. Architectural concrete textures
13. Architectural surface finishes

The AEIP shall include adjacent natural and man-made features, conceptual design elements, limits of construction phasing, and clear labels or a legend to identify these elements. The AEIP shall be formatted as a roll plan at a minimum scale of 1 inch = 100 feet. The AEIP shall include contiguous geographic warranty areas as specified in Section 5.7 (Establishment Period).

5.3.1.1 Allowance Work

As part of the AEIP, Developer shall include a separate section detailing the aesthetic elements related to the Landscaping Work Allowance. This portion of the AEIP shall clearly delineate those elements subject to the allowance, their use, and estimated cost. Developer shall include a tracking mechanism for all of the items in the AEIP that are subject to the Landscaping Work Allowance. Refer to Attachment 5-1 for community vision for Landscaping Work Allowance.

5.4 Design Requirements

5.4.1 Landscape Architect Requirements

Developer shall have an experienced landscape architectural design team to address, in a collaborative, multidisciplinary approach, the functional and aesthetic needs of the Project. The landscape architectural team shall be led by an Indiana-registered landscape architect with more than 10 years of landscape architectural design experience related to highway corridor design and construction. The lead landscape architect shall have a working knowledge and experience with; the implementation process of context-sensitive designs/solutions, native vegetation of the Midwestern and Great Lakes regions, and stormwater management/bioretention planting.

5.4.2 Landscape and Aesthetics Plans

Developer shall prepare landscape plans for the aesthetics and landscape enhancements, based on the AEIP, and include these landscape plans in the Design Documents. The landscape plans shall be developed to reflect the use of native plants, native grasses, and native wildflowers as appropriate, such as those cultivated through INDOT's Roadside Heritage program, to revegetate disturbed areas within the Project to the fullest extent possible. Large masses or groupings of trees and shrubs shall be used whenever possible to create naturalistic plantings that have continuity and provide for genetic diversity and seasonal interest to the fullest extent possible. Developer shall coordinate the landscape plans with all other elements of Work performed under the Project, including: final grading; turf establishment; SWM Best Management Practice (BMP) locations; highway clear zones and sight distances; storm drain, SWM BMP, and cross-culvert outfalls; Utilities, signing/lighting; and earth reinforcement.

Developer shall provide temporary measures to stabilize soils in rough graded areas in accordance with applicable Project Standards. If Developer determines the existence of a conflict from one or more of these elements, Developer shall be responsible for modifying the landscape plans while retaining the intent of the design. Areas used for SWM BMPs shall not be used for landscape plantings. Landscape plantings required as part of the SWM plans shall be coordinated with the landscape plans to ensure a unified planting theme for the Project. Developer shall permanently revegetate all bare and disturbed areas within the Project Right of Way in accordance with the Standard Specifications. Developer shall use INDOT Seed Mix R for all bare and disturbed areas, except in shrub beds and environmental mitigation areas specified in Section 7.

5.4.3 Landscape

The approved plant species, minimum acceptable sizes, and maximum spacing are listed in Table 5–1. Developer may suggest a plant species mix to reflect a specific condition if

necessary. Requests for substitution of other plant species shall be submitted in writing for approval by IFA. Developer shall not plant non-native, invasive species.

5.4.3.1 Landscape Maintenance

Developer shall design the landscape treatments to facilitate and minimize future maintenance. Plant materials selected shall be drought-tolerant, native species with proven track records of success in the region.

Developer shall match the planting densities by plant type (tree, shrub, groundcover, etc.) to the IFA-approved AEIP for all plantings. Developer shall provide native seeding for any Project areas disturbed and not designated for planting.

5.4.4 Landscape Treatments

All landscape areas within the Project Limits shall include landscape treatments to address permanent erosion control and aesthetics. Developer shall design landscape treatments to support the AEIP with and without plant material and to employ contour grading, slope rounding, and other design/construction methods to help emphasize the concept of the corridor. Developer shall integrate drainage design, especially for surface channels and detention basins/water quality basins, into the design of the aesthetics for the landscape treatments.

5.4.5 Median/ Island Treatments

Developer shall use concrete paving where medians or islands are less than 18 inches wide, where plant material would interfere with sight distances, or where maintenance access/safety is necessary. If concrete paving is used along a local street, paving shall match the city or community standards/requirements.

5.4.6 Noise Barrier/Retaining Wall Areas

Developer shall include areas for plantings adjacent to the noise barriers, which includes the side facing the roadway corridor. A minimum 10-foot zone with no plantings except turf grass shall be provided for maintenance access on the residential side. For areas adjacent to the noise barriers on the residential side that exceed 10 feet in width to the Project ROW, Developer shall provide landscape treatment for the portion that exceeds 10 feet. Deciduous, ornamental, and evergreen trees shall not be planted closer than 15 feet to the noise barrier/retaining wall face. Refer also to Attachment 5-2 (Noise Barriers).

5.4.7 Stormwater Management Areas

All stormwater treatment facilities shall be coordinated with the landscape to create a seamless aesthetic design and be compatible with the existing landscape of the adjacent land uses and surroundings. Plant selections at SWM areas shall be appropriate for each facility type.

Planting at SWM facilities shall provide maximum environmental value (water quality, wildlife, biodiversity) while providing low-maintenance, native landscapes within curvilinear-shaped SWM facilities. Developer shall choose native trees and shrubs with consideration to spring and fall color to enhance Indiana's native beauty. Winter plant structure shall be emphasized in the choice of native grasses and forbs.

5.4.8 Design Coordination

The aesthetics and landscape designers shall coordinate with other design disciplines on the location of proposed underground facilities, such as Utilities and drainage lines, so that the landscape installation does not damage other facilities.

5.5 Construction Requirements

5.5.1 Landscape Requirements

Tree clearing and snag removal shall be kept to a minimum and limited to within the construction limits and calendar requirements. Tree clearing shall be kept to a minimum outside the clear zone, with woods kept in as much of a natural state as reasonable in bifurcated sections with widened medians.

Developer shall install plantings and other landscape materials using IFA's Project Standards. All plantings shall be installed in a timely manner in relation to the other Work to minimize unsightly bare earth. Plant material delivered to the Site shall be planted within 48 hours of delivery.

Developer shall provide a method and schedule for watering all plantings, including existing vegetation in the Project that is to remain during construction for approval by IFA.

5.5.1.1 Topsoil

Developer shall place topsoil, either salvaged from on-Site or imported, to a 6-inch depth in all planting areas. Developer may use existing topsoil if the soils tests prove the existing soils to be a sufficient growing medium and with the written approval of IFA. Soil testing shall be in accordance with the Department specifications.

5.5.1.2 Soil Preparation

The soils in all areas to be landscaped shall be prepared prior to beginning plantings in accordance with the Department's specifications. Developer shall perform a minimum of 20 soil tests spaced evenly through the Project landscape areas, including native seed areas. All imported soil sources shall be tested prior to delivery on-Site. Soil tests shall determine what amendments are necessary for the successful establishment of the plantings. Developer shall be responsible for submitting a memorandum with the resulting soil tests, a map showing sample locations, and the proposed approach to the amendment placement (including type and amounts) to IFA for approval before beginning soil preparation, planting, or seeding.

5.5.1.3 Herbicide

All areas to receive planting, other than native seeded areas, shall be treated with a pre-emergent herbicide prior to planting. Pre-emergent herbicide treatments used shall not be detrimental to the intended replacement plantings. The application of herbicide shall follow the Department's standards, Recurring Special Provisions 624-M-024, and the manufacturer's recommendations. In addition, the application of the pre-emergent herbicide shall be in compliance with the Noxious Weed Control Plan described later in this Section 5.

Developer shall treat any perennial weed species with a post-emergent non-selective herbicide not less than two weeks prior to beginning soil preparation activities. Perennial weed treatment shall be per the Department's standards and in accordance with the approved Noxious Weed Control Plan.

5.5.1.4 Mulching

All landscape areas, other than seeded areas, shall be mulched to reduce erosion, lessen weed germination and growth, and inhibit water loss from the soil. Mulch shall be broken corncobs, wood chips, chopped bark, size No. 5 gravel, or crushed stone, in accordance with the Department's standards.

Wood chip mulch shall be placed per the Department's standards in all plant basins. Mulch shall not contain anything that would inhibit growth of the replacement plantings. Mulch shall be capable of matting together to resist scattering by the wind. Developer may shred or grind any on-Site woody plant material for use as mulch, as long as the species present do not produce growth-inhibiting substances that might jeopardize the new plantings. The stockpiling of mulch shall be carefully planned to prevent combustion from generated heat.

5.5.2 Landscape Maintenance

Developer shall maintain all landscaping within the O&M Limits, including the following activities:

1. Watering: All proposed tree, shrub, and other plantings and existing vegetation in the Project area to remain shall be kept sufficiently watered so that plants are provided water during all phases of the Project.
2. Weed Control: Maintain the planting and lawn areas free of weeds.
3. Pruning: Prune damaged branches on trees and shrubs in conformance with International Society of Arboriculture standards to prevent further injury or disease. Avoid root pruning, but if root pruning cannot be avoided, conform to International Society of Arboriculture standards.
4. Insect and Pest Control: Monitor plant materials for any insect or pest problems. Spray or dust with appropriate insecticides and fungicides as necessary to maintain plants in a healthy and vigorous condition.
5. Erosion Control: Replace mulch as needed. Repair eroded areas if needed. Complete repairs within one week of notification, or per SWM requirements, whichever is most restrictive.
6. Plant Replacement: Replace damaged or dead plant materials within one week of notification.

5.6 Submittals

5.6.1 Nutrient Management Plan Report

Developer shall comply with the Indiana Natural Resources Conservation Service (NRCS) Nutrient Management Code 590.

Before performing turf establishment and sodding, Developer shall sample and test soils for texture, pH, organic matter, phosphorus, and potassium needs in accordance with Project Standards and requirements of the Office of Geotechnical Services.

Developer shall use the soil test results and obtain the services of an Indiana-certified nutrient management planner to develop a Nutrient Management Plan for nitrogen, phosphorus, potassium, organic matter, sulphur, and limestone input levels for planting areas. The Nutrient Management Plan shall be submitted to the IFA with the RFC Plans for review and comment. A directory of certified nutrient management planners may be found by contacting Indiana's NRCS Nutrient Management Specialist, at (317) 290-3200.

5.6.2 Soil Reports

Developer shall submit all soil testing reports to IFA for review and comment. The soil report shall be completed and submitted in advance of the Nutrient Management Plan and coordinated with its requirements.

5.6.3 Noxious Weed Control

Developer shall perform the control of noxious weed species within the Project ROW, easements, and limits of disturbance until Final Acceptance. Control of noxious weeds shall apply as required by Indiana's applicable seed laws. Developer shall prepare and submit a Noxious Weed Control Plan to IFA for review and comment prior to the commencement of eradication or removal work. If chemical controls are proposed they shall be applied by a certified pesticide applicator.

5.7 Establishment Period

IFA will provide its initial approval for plantings and landscape work only after all plant materials within a geographic warranty area approved by IFA have been planted, are true to species and minimum size, and are in a healthy and thriving condition. In addition, each plant pit or bed shall be properly filled, mulched, pruned, and staked. Developer shall define geographic establishment areas and submit to IFA for approval with the AEIP. No more than 10 geographic establishment areas shall be designated. The geographic establishment areas shall be contiguous and well defined by landmarks such as bridges and cross roads. SWM facilities and riparian plantings shall be included in the areas proposed for initial approval. Developer shall replace any plantings or landscape work areas damaged after initial approval by IFA and prior to Final Acceptance.

Upon Final Acceptance, Developer shall maintain all landscape plantings provided by Developer outside the O&M Limits for a one-year establishment period as part of the one-year warranty described in Section 5.11.1 of the PPA.

During this one-year establishment period, Developer shall replace any plant materials that have (i) died, (ii) failed to establish a root system reasonably expected for landscaping of a similar type, nature and maturity or (iii) failed to show a growth habit reasonably expected for the landscaping of a similar type, nature and maturity and in accordance with the Department's Standard Specifications.

5.7.1 Final Landscape Acceptance

At the end of the one-year establishment period, Developer shall request that IFA perform the final inspection of any landscape areas outside of the O&M Limits. Developer shall provide a minimum of three weeks advance notice for IFA to perform the final inspection. Concurrent with Developer's request for a final inspection, Developer shall submit a Plant and Turf

Establishment Certification Package to IFA that consists of field photographs, completed turf inspection checklists and completed planting checklists, and Project landscape plans and details.

5.7.1.1 Plant and Turf Establishment Inspections

Prior to IFA's final inspection described in Section 5.7.1, Developer shall inspect plants at the end of the one-year establishment period for species, size, quantity, health, and location. Plants that measure smaller than the installed size shall be considered dead and be replaced. Plant and Turf Establishment inspections shall be conducted in accordance with the Department's standards.

The following planting and turf shall be inspected and documented:

1. All plantings shall be in a thriving condition.
2. All groundcover areas shall have a 95 percent cover of the specified groundcover, with no bare areas greater than 144 square inches.
3. Ponds and wetlands in accordance with Section 7 (Environmental) and Section 8 (Drainage).
4. SWM facilities: Vegetation survival rate of 50 percent shall be verified at submerged benches if provided.
5. Infiltration Trenches: Turf establishment with 95 percent coverage of Department permanent seed mix inspected in conveyances, filter strips, and other features draining to the trench that are within the Project ROW and within the limits of disturbance. Off-site areas shall be visually observed and the location of off-Site eroded or bare areas included in the report and photographed.
6. Infiltration Basins: Plant, turf, or native meadow establishment inspected at basin bottom and side slopes. Establish turf with 95 percent coverage on all conveyances draining to the facility within the Project ROW and within the limits of disturbance. Off-Site areas shall be visually observed, and the location of off-Site eroded or bare areas included in the report and photographed.
7. Filtering Systems: Establishment of turf with 95 percent coverage on weir, bottom, and sides of facility, and all conveyances draining to the facility. At bioretention facilities, verify a plant survival rate of at least 90 percent. The mulch bed shall be inspected and replenished to constructed depth and condition.
8. Open Channel Systems: For dry swales, inspect the establishment of turf with 95 percent coverage on weir, bottom, side slopes, and conveyances draining to the facility. For wet swales, inspect the establishment of turf with 95 percent coverage on weirs, sides, and all conveyances draining to the facility. Inspect planting at the bottom of the facility for a 50 percent survival rate.

Table 5–1 Approved Plant List

Botanical Name	Common Name	Minimum Size	Maximum Spacing
Deciduous Trees			

Botanical Name	Common Name	Minimum Size	Maximum Spacing
Acer rubrum	Red maple	2.5-ft cal. B&B/CG	25-ft OC
Acer saccharinum	Silver maple	2-ft cal. B&B/CG	30-ft OC
Acer saccharum	Sugar maple	2.5-in cal. B&B/CG	30-ft OC
Amelanchier arborea	Serviceberry	8-ft ht. B&B/CG	15-ft OC
Betula nigra	River birch	6-ft ht. B&B/CG	30-ft OC
Carpinus caroliniana	American hornbeam	2-in cal. B&B/CG	20-ft OC
Carya cordiformis	Swamp hickory	2-in cal. B&B/CG	40-ft OC
Carya glabra	Pignut hickory	2-in cal. B&B/CG	30-ft OC
Carya ovata	Shagbark hickory	2-in cal. B&B/CG	40-ft OC
Celtis occidentalis	Hackberry	2-in cal. B&B/CG	30-ft OC
Cercis canadensis	Redbud	2.5-in Cal. B&B/CG	15-ft OC
Cornus alternifolia	Alternate-leaf dogwood	2-in cal. B&B/CG	20-ft OC
Cornus florida	Flowering dogwood	2-in cal. B&B/CG	25-ft OC
Crateagus viridis	Hawthorn	2.5-in cal. B&B/CG	20-ft OC
Diospyros virginiana	Persimmon	5-ft ht. B&B/CG	20-ft OC
Fagus grandifolia	American beech	2.5-in cal. B&B/CG	25-ft OC
Juglans nigra	Black walnut	2-in cal. B&B/CG	40-ft OC
Liriodendron tulipifera	Tulip Poplar tree	2.5-in cal. B&B/CG	25-ft OC
Nyssa sylvatica	Black gum	2-in cal. B&B/CG	25-ft OC
Platanus occidentalis	Sycamore	2.5-in cal. B&B/CG	40-ft OC
Quercus alba	White oak	2-in cal. B&B/CG	25-ft OC
Quercus bicolor	Swamp white oak	2-in cal. B&B/CG	20-ft OC
Quercus coccinea	Scarlet oak	2-in cal. B&B/CG	25-ft OC
Quercus imbricaria	Shingle oak	2-in cal. B&B/CG	40-ft OC
Quercus macrocarpa	Bur Oak	2-in cal. B&B/CG	40-ft OC
Quercus muehlenbergii	Chestnut oak	2-in cal. B&B/CG	25-ft OC
Quercus palustris	Pin oak	2-in cal. B&B/CG	40-ft OC
Quercus rubra	Red oak	2-in cal. B&B/CG	30-ft OC
Sassafras albidum	Sassafras	6-ft ht. B&B/CG	30-ft OC
Tilia americana	American linden	2-in cal. B&B/CG	25-ft OC
Evergreen Trees			
Juniperus virginiana	Eastern Red cedar	6-ft ht. B&B/CG	15-ft OC
Pinus strobus	White pine	5-ft ht. B&B/CG	25-ft OC
Tsuga canadensis	Eastern hemlock	6-ft ht. B&B	25-ft OC
Shrubs			
Ceanothus americanus	New Jersey tea	2-ft ht. CG	3-ft OC
Cephalanthus occidentalis	Buttonbush	2-ft ht. CG	3-ft OC

Botanical Name	Common Name	Minimum Size	Maximum Spacing
Cornus amonmum	Silky dogwood	3-ft ht. CG	5-ft OC
Cornus racemosa	Gray dogwood	3-ft ht. CG	5-ft OC
Ilex verticillata	Winterberry holly	3-ft ht. CG	5-ft OC
Itea virginica	Virginia Sweetspire	3-ft ht. CG	3-ft OC
Lindera benzoin	Spicebush	2-ft -ht. CG	6-ft OC
Physocarpus opulifolius	Ninebark	3-ft ht. CG	5-ft OC
Rhus aromatica	Fragrant sumac	2-ft ht. CG	4-ft OC
Sambucus canadensis	Elderberry	2-ft ht. CG	5-ft OC
Symphoricarpos orbiculatus	Coralberry	2-ft ht. CG	4-ft OC
Viburnum dentatum	Arrowwood viburnum	3-ft ht. CG	5-ft OC
Perennials			
Asclepias tuberosa	Butterfly weed	Plug	12-in OC
Aster novae-angliae	New England aster	Plug	12-in OC
Aster laevis	Smooth Blue Aster	Plug	12-in OC
Baptisia lacteal	Wild White Indigo	Plug	12-in OC
Baptisia australis	Blue False Indigo	Plug	12-in OC
Cassia hebecarpa	Wild Senna	Plug	12-in OC
Coreopsis lanceolata	Lanceleaf Coreopsis	Plug	12-in OC
Coreopsis tripteris	Tall Coreopsis	Plug	12-in OC
Desmanthus illinoensis	Illinois Sensitive Plant	Plug	12-in OC
Echinacea purpurea	Purple coneflower	Plug	12-in OC
Eryngium yuccifloium	Rattlesnake Master	Plug	12-in OC
Geum triflorum	Prairie Smoke	Plug	12-in OC
Liatris pycnostachya	Prairie Blazing Star	Plug	12-in OC
Monarda fistulosa	Bergamot	Plug	12-in OC
Parthenium integrifolium	Wild Quinine	Plug	12-in OC
Penstemon digitalis	Foxglove Beard Tongue	Plug	12-in OC
Ratibida pinnata	Yellow Conflower	Plug	12-in OC
Rudbeckia subtomentosa	Sweet Black-Eyed Susan	Plug	12-in OC
Rudbeckia triloba	Brown-Eyed Susan	Plug	12-in OC
Rudbeckia fulgida	Showy Black-Eyed Susan	Plug	12-in OC
Silphium laciniatum	Compass Plant	Plug	12-in OC
Tradescantia ohiensis	Common Spiderwort	Plug	12-in OC
Grasses			
Andropogon geradii	Big bluestem	1-qt. CG	24-in OC
Bouteloua curtipendula	Sideoats gramma	1-qt. CG	18-in OC
Schizachyrium scoparium	Little bluestem	1-qt. CG	18-in OC

Botanical Name	Common Name	Minimum Size	Maximum Spacing
Sorghestrum nutans	Indian Grass	1-qt. CG	18-in OC
Groundcovers			
Vines			
Aristolochia tomentosa	Woolly Dutchman's pipe	1-qt. CG	5-ft OC
Campsis radicans	Trumpet creeper	1-qt. CG	25-ft OC
Parthenocissus quinquefolia	Virginia creeper	1-qt. CG	20-ft OC

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6 PUBLIC INVOLVEMENT

6.1 General

This Technical Provision outlines the requirements for the Public Involvement Plan (PIP) program and defines the roles and responsibilities for this effort.

The PIP program includes activities of IFA and Developer, including the following:

- PIP
- Community involvement and meetings
- Communications with the public
- Public notices
- Media relations
- PIP portions of the Transportation Management Plan
- Bloomington Project Office

In support of IFA, Developer shall provide assistance with regard to community participation and interaction during the development of the design and construction of the Project.

6.2 Standards and References

Perform the public involvement Work in accordance with the applicable requirements of the PPA Documents, including Project Standards and this Section 6; Governmental Approvals; and applicable Laws.

6.3 Requirements

The community involvement and participation element is intended to advance previous dialogue with residents, landowners, community groups, local officials, participating agencies and community advisory committees from the NEPA work, and other stakeholder groups. The PIP shall include Developer's approach to and tasks related to background research as a basis for approach to Public Involvement.

6.4 IFA Public Involvement Responsibilities

IFA and Developer have shared responsibility for the PIP program.

Except for the items expressly referenced in this Section 6 as being the responsibility of IFA, Developer shall have primary responsibility for performing the public information activities, as well as in the PPA Documents.

IFA's responsibilities as lead will include the following activities:

- Designate an IFA PIP Program Manager to function as a single point of contact for Developer regarding PIP activities.
- Maintain quality assurance of any approved communication efforts by Developer.

- Liaise with and monitor Developer's performance for compliance with the PIP program requirements of the PPA Documents.
- Function as the official spokesperson for the Project, except as described below.
- Coordinate media activities, such as interviews, including those with Developer staff; press releases; and media events.
- Continue customer services activities, including:
  - Staff the Bloomington Project Office
  - Respond to property owner and public questions and complaints
  - Forward questions and complaints applicable to the Developer
  - Maintain customer service database

6.5 Developer Public Involvement Responsibilities and Requirements

6.5.1 Public Involvement Plan

6.5.1.1 General PIP Requirements

Developer shall submit to IFA its Public Involvement Plan, which is a component of the PMP that addresses all public involvement tasks defined in this Section 6 and elsewhere in the PPA Documents. See Attachment 1-1 for submission schedule and review requirements.

The PIP shall detail how Developer proposes to engage communities, neighborhood organizations, historic preservation groups, and other stakeholders in the design and construction of the Project. Developer's PIP shall include a Community Outreach Plan that ensures local participation in the Context Sensitive Solutions process. Developer shall make a good-faith effort to support IFA in addressing any concerns the public may have and to consider all reasonable suggestions from the public. Documentation shall be in the form of meeting minutes and correspondence, including emails.

Developer shall coordinate with IFA to develop a common set of speaking points and answers to address routine questions that do not require consultation with IFA (e.g., construction schedules, anticipated closures, etc.). Beyond addressing these standard questions and requests, Developer shall direct all other requests it receives to IFA and shall assist in preparing responses. Developer shall obtain written approval for all design or construction modifications resulting from public involvement.

The PIP shall detail proposed communication tools to supplement outreach efforts, such as Project identity, Project web site, social media sites, brochures, educational opportunities, newsletters, and preparation of press releases.

6.5.1.2 Landscaping and Aesthetics Meeting Requirements

The PIP shall detail how Developer proposes to engage the stakeholders in the landscape and aesthetic design. Developer shall prepare a minimum of two sets of concept alternatives for the Landscaping Work Allowance as described in Section 5 (Aesthetics and Landscape Architecture). At a minimum, Developer shall plan and conduct the following meetings:

- One meeting to present the overall construction schedule for this work and allow the stakeholders to vote on aesthetic treatment alternatives.

- Two meetings (one each spring) to update the stakeholders on general construction activities and schedules for the upcoming construction season.
- Meetings as required to coordinate the aesthetic design of noise barriers with affected communities, in conjunction with Section 7.7 (Noise Barrier and Noise Attenuation). Developer shall propose approach and selection process for patterns and color options for the neighborhood side of noise barriers.

6.5.2 Public Information Coordinator

Developer shall provide a Public Information Coordinator to lead all Developer public information tasks. The Public Information Coordinator shall have at least three years of recent experience coordinating information on highway improvement projects, including the following:

- Writing for the public, news media, and the Internet.
- Providing and presenting information to the public, news reporters, community groups, and others.
- Developing, implementing, and measuring the results of strategic communication plans and strategic messaging
- Developing and producing maps, charts, graphs, diagrams, and other visual images.
- Developing and implementing public involvement and community relations programs.

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

6.5.3 Developer's Response to Inquiries and Comments

- Questions or comments from residents, businesses, or other members of the public shall be referred to IFA's PIP Program Manager within one half of a Business Day. Developer shall take the necessary steps to facilitate such contact.
- If Developer receives a complaint regarding its conduct of work on the Project, Developer shall notify IFA's PIP Program Manager within one half of a Business Day. Developer shall provide the necessary information, staff support, and representation to assist in resolving the issue.
- On occasions specified by IFA, Developer shall commit its Project Manager to serve as a spokesperson for the Project for technical and safety issues with certain designated audiences.

6.5.4 Public Notifications

- Developer shall facilitate IFA's notification of the public and affected businesses and residents. As directed by IFA, this shall include direct contact with affected parties for updates on upcoming events.
- Developer shall provide the specific notifications listed in Table 6-1 to IFA and PIP Program Manager.

Table 6-1 Notifications

Notice	Requirement
Written Notification	All written notification shall be sent on standard I-69 Section 5 Project Letterhead.
Lane Closure	Depending on the duration of the Closure, written notices shall be posted in advance of planned Closures at the start and end of the Project and at intermediate intersections/junctions with United States (U.S.), state, or county highways and roads.
Critical Utility Shut-off/Diversion	Written notice at least 48 hours, or as agreed to in Utility Agreement, in advance of shut-off and, as applicable, diversions. Copy of notice to IFA PIP Program Manager.
Business/Commercial Utility Shutdown	Written notification of Utility shutdown or diversion for businesses and commercial property at least 48 hours, or as agreed to in Utility Agreement, in advance of shut-down. Copy of notice to IFA PIP Program Manager. Notice shall be coordinated in advance with IFA.
Residential Utility Shutdown	Written notification of Utility shutdown or diversion for residential property 48 hours, or as agreed to in Utility Agreement, in advance of shut-down. Copy of notice to IFA PIP Program Manager. Notice shall be coordinated in advance with IFA.
Weekly Construction Updates	Construction updates shall be provided weekly and shall identify all planned traffic shifts, lane Closures, and Utility shut-downs and activities. Updates shall cover at a minimum the prior week and project out the next 6 weeks.
Emergency Unforeseen Utility Disruptions, Hazardous Conditions, Traffic Emergencies, Security, and Loss of Access	See Section 6.5.6.
Blasting Notification	See Section 7.8.
Property Access Notification	Non-emergency and emergency access may be required on private properties outside the Project Right of Way. Contact information for some private properties is available through IFA PIP Program Manager. Developer shall be responsible for securing permission to access private property from property owner. Developer shall supply information to IFA PIP Program Manager documenting access approval from the property owner prior to accessing the property.
Road and Driveway Closures	Written notice and personal contact in advance of closure, as specified in Maintenance of Traffic (MOT), Haul Routes, and Access During Construction Technical Provisions. Copy of notice to IFA PIP Program Manager.

Notice	Requirement
Road Closures impacting School Access	Changes in roads used by school bus routes will be discussed with the school systems a minimum of 28 days prior to when they actually take place so the school systems can adjust routes in a timely manner. Where roads are severed, provisions for turnarounds will be included during the final design phase of the project.
Road Closures impacting transit system operations	For routes with transit system operations, written notice shall be sent to the transit system operator 28 days prior to when a route will be affected.

6.5.5 Public Contact Records

Developer shall maintain a consistent system for documenting all Developer and IFA contact with business owners, residents, the media, and property owners. Unless otherwise directed, Developer shall direct all requests for comment to the IFA PIP Program Manager. Developer shall provide IFA's PIP Program Manager with an updated electronic version of all public contact records monthly. Developer shall submit the file by the 1st of each month and shall include all contacts made prior to the 25th of the previous month.

6.5.6 Emergency, Unforeseen Utility Disruptions, Hazardous Conditions, Traffic Emergencies, Security, and Loss-of-Access Notifications

Developer shall develop a Safety Plan, which is a component part of the PMP, for all Work with input from law enforcement or fire suppression agencies. See Attachment 1-1 for submission schedule and review requirements. Department practices are described in the *INDOT Employee Safety Manual*. The Safety Plan shall, at a minimum address these key features:

- OSHA Safety measures and procedures
- Incident Management Plan to include emergency response measures to construction sites
- Construction site security
- Traffic control safety measures and procedures
- Review schedule for Temporary Traffic Control Plans to confirm adherence to safety procedures

The plan at a minimum shall require Developer to provide immediate response to emergencies by trained personnel from an Incident response team within 60 minutes of receiving notification from IFA, law enforcement or fire suppression agencies, Utility Owners, and, as applicable, affected businesses and, as applicable, residents. Immediately following the initiation of actions necessary for the security of people and property, Developer shall coordinate with IFA the explanation of all emergency or unforeseen disruptions. IFA will serve as the spokesperson with affected parties and media for all emergencies and, as applicable, unforeseen disruptions. At a minimum, Developer shall provide IFA with details on the following:

- Cause of disruption (i.e., whether it is construction related or not).
- Actions being taken to alleviate the issue.
- Responsible party for the actions.
- Anticipated duration of the disruption.

Developer shall establish and manage an emergency response telephone tree. All appropriate emergency response agencies shall be included on this telephone tree for immediate response in the event of an emergency. The telephone tree shall be divided into areas of expertise so that the proper people are called for specific emergency situations.

Developer shall notify IFA one month before starting Construction Work in any area of the Project.

6.5.7 Project Identification Signage

Developer shall install ground-mounted Project identification signs 30 days after NTP2 to be placed at the start and end of the Project, at each approach of US and/or State Highway intersections/junctions with Mainline, at the Project Office (if along the Project alignment), and at all field offices. The Project identification signs shall identify the IFA and Department by their official logos and show the name of the Project, the Project hotline number, the Project website address, and the Project logo. A sample of the Project identification sign shall be submitted to IFA for review and comment 30 days prior to installation. Signs and lettering shall be sized appropriately for the speed limit in the area, using Manual on Uniform Traffic Control Devices size guidelines.

6.5.8 Public Forums

At the specific request of IFA, Developer shall participate in IFA-organized public forums.

6.5.9 Construction Progress Photographs

Developer shall provide to IFA high-resolution construction progress photographs in electronic format at least monthly or any time a new or significant activity commences. Monthly submissions shall include, at a minimum, 10 new progress photos. In addition, Developer shall facilitate requests and make arrangements for IFA to take additional photos on an as-requested basis. Distinct from progress documentation photos, the purpose of photos identified in this Section 6 is to facilitate public information via Project web site, newsletters, and other such materials.

6.6 Other Developer Activities

Developer is encouraged to provide additional, cost-effective services to enhance the overall PIP program. Additional services shall adhere to the standards indicated in the PIP and be a supplement to the services outlined in this Section 6. Any such enhancements may be implemented at any time during the project, subject to IFA's review and approval. Any enhancements would be at Developer's sole cost, unless directed by the IFA pursuant to Article 16 of the PPA.

6.7 Media Relations

Media relations will be handled by IFA unless otherwise specified in this Section 6.

Developer shall provide mobile phone numbers for the Public Information Coordinator and Project Manager to IFA.

The Developer shall maintain a common set of speaking points and standby questions and answers that is updated monthly with changing media inquiries and Project activities.

The Developer shall assist in preparing news releases and other publications necessary to inform the public of design, construction and maintenance activities and the activities' impacts to traffic.

Developer representative shall participate in bi-weekly communications coordination teleconferences through the completion of the construction phase for the Project.

During the Operations & Maintenance period following Substantial Completion, Developer shall have on-going media relations responsibilities for communicating lane closures, maintenance (graffiti removal or mowing), and incident response (crashes and snow removal).

Developer shall not interface with the media without the expressed consent of IFA, except as specifically directed by IFA. Developer shall immediately notify IFA of any situations, including Incidents and Emergencies, which may attract media attention.

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7 ENVIRONMENTAL

7.1 General

Developer shall design and construct the Project in accordance with the requirements of the PPA Documents, including this Section 7; and Project Standards; Environmental Laws; and Governmental Approvals.

Further discussion of the environmental impacts of the Project is provided in the following documentation:

- I-69 Evansville to Indianapolis, Indiana Project Section 5, Bloomington to Martinsville, Indiana, Tier 2 Final Environmental Impact Statement (FEIS)/Record of Decision

See Attachment 7-1 for a listing and status of IFA-Provided Approvals and Major Environmental Approvals as well as identification of Major Environmental Approval Deadlines. Developer shall conduct all Work necessary to meet the requirements of Environmental Approvals, Environmental Law, permitting, and mitigation measures, including such areas as land use, social and neighborhood, noise, construction, historic and archaeological resources, visual impacts, hazardous materials impacts, flood plain impacts, wetland impacts, farmland impacts, forest impacts, stream and water body modification impacts, ecosystem impacts, water quality impacts, managed lands, threatened and endangered species, and karst topography.

7.2 IFA's Environmental Roles and Responsibilities

The Department has conducted extensive coordination with the public and various state and federal environmental and regulatory agencies. The coordination was conducted throughout the development of the 2012 DEIS and 2013 FEIS, and the ROD prepared August 7, 2013. The requirements of the Technical Provisions include the commitments arising out of those processes that IFA will delegate to Developer to complete.

7.3 Developer's Responsibilities

Developer shall obtain all necessary Governmental Approvals other than IFA-Provided Approvals, comply with all conditions and requirements of all Governmental Approvals, and achieve and maintain the environmental requirements and commitments through the development and implementation of an Environmental Management System (EMS) that includes all environmental performance requirements in this Section 7. Developer shall provide an Environmental Compliance and Mitigation Plan while partnering with IFA. The Environmental Compliance and Mitigation Plan shall include all environmental commitments and required mitigation listed in the Technical Provisions.

Developer shall prepare a checklist that documents all impacts and anticipated impacts to environmental resources that are identified in the PPA Documents, Environmental Approvals, and any Governmental Approval. The checklist shall be submitted with the ECMP for IFA review and approval. Developer shall submit an updated checklist to IFA for review and approval within one week after the end of each quarter. The checklist is to stipulate those requirements that are to be reviewed by the Department for concurrence and those requirements that are expected to be reviewed for concurrence in the subsequent quarter.

Developer shall designate an on-Site Environmental Compliance Manager (ECM) to be responsible for Developer's compliance with all the environmental commitments and conditions of Environmental Approvals required for the Project. The ECM shall be considered a Key Personnel and have a minimum of 10 years of experience, with demonstrated expertise with construction management; permitting compliance; and overall environmental compliance on large-scale, complex transportation projects with environmentally sensitive areas.

The ECM shall report directly to Developer's Project Manager. The ECM shall be the primary liaison to IFA for environmental issues. The ECM shall be a full-time, on-Site member of Developer's staff. The ECM shall have the authority to stop or redirect Construction Work as needed to maintain environmental compliance.

Developer shall develop and implement a mandatory environmental compliance and mitigation training program that will be presented to Developer's supervisory personnel, equipment operators, and all other Contractor construction personnel that will enter within the Project ROW boundaries to perform the Work. The training shall provide an understanding of the necessary environmental compliance requirements and any environmentally sensitive areas for the Project.

The training program shall be submitted to IFA for review and approval and cover at a minimum the following elements:

- Erosion and sediment control measures – sequencing, implementation, installation, and maintenance, including special measures and requirements for karst topography
- Discovery of unidentified karst features
- Maintaining approved limits of disturbance
- Tree and shrub protection
- Avoidance and minimization of impact to environmentally sensitive locations, including wetland areas, streams, sinkholes, or other water bodies and activities that would require modifications to waterway permits
- Wildlife education, including habitat protection for Indiana bats, bald eagles, and any other state endangered, threatened, or rare species
- IFA-provided endangered, threatened, and rare species training video shown to all personnel prior to entry within the Project ROW.
- Seasonal work restrictions – trees and waterways
- Pumping and dewatering operations
- Zebra mussel decontamination
- Accidental discovery of archaeological sites, archaeological material, or human remains
- Impacts and consequences for departure from approved operating procedures
- Hazardous materials
- Historic properties and structures

The environmental compliance and mitigation training program is a component part of the PMP. Developer shall not allow personnel to enter the Project ROW without completing the required training and documenting the training for the IFA. Developer shall provide annual updates to this training program to meet current requirements and implement the training to the appropriate personnel.

7.4 Governmental Approvals and Modifications

Developer shall be responsible for securing all Governmental Approvals necessary to complete the Work, unless designated otherwise in Table 7-1. IFA is in the process of obtaining certain IFA-Provided Approvals identified in Attachment 7-1. Developer shall provide conditional information requested by the permitting agencies, based on the Final Design. IFA-Provided Approvals are based on the Reference Design. Attachment 7-1 also sets forth Major Environmental Deadlines for each of the Major Environmental Approvals. See Sections 4.3 through 4.5 of the PPA for specific requirements, obligations, and information regarding Governmental Approvals and Environmental Approvals, including any modifications to Governmental Approvals; IFA-Provided Approvals; Major Environmental Approvals; and Major Environmental Approval Deadlines.

Table 7-1: Government Approvals

Agency	Permit/Approval	Responsible Party
Indiana Department of Environmental Management (IDEM)	Section 401 Water Quality Certification	IFA[1] Developer[2]
US Army Corps of Engineers (USACE)	Section 404 of the Clean Water Act	IFA[1] Developer[2]
Indiana Department of Environmental Management (IDEM)	National Pollution Discharge Elimination System (NPDES)	Developer
Indiana Department of Environmental Management (IDEM)	Isolated Wetlands	Developer[3]
Indiana Department of Natural Resources (IDNR)	Construction in a Floodway (CIF)	Developer
Indiana Department of Environmental Management (IDEM)	Rule 5 – Storm water	Developer
INDOT, IDNR, IDEM, and U.S. Fish and Wildlife Service (USFWS)	Karst MOU (1993) and Section 5 Karst Agreement (November 2013)	Developer[4]
Federal Aviation Administration (FAA)	Tall-Structure Permit	Developer
United States Environmental Protection Agency (US EPA)	Class V Injection Well Permit	Developer

Notes:
1) IFA has filed Section 401/404 permit application packages included in Attachment 7-1 with the permit agencies in an effort to advance preconstruction environmental permits. Developer shall comply with these preconstruction permit requirements or be responsible for securing any required permit modifications and performing the additional mitigation.

2) Developer is responsible for obtaining all preconstruction environmental permits required for the O&M Work.
3) No isolated wetlands were identified by IFA within the advance preconstruction environmental permit limits. If Developer proposes to work in isolated wetlands, Developer shall be responsible for securing the required permits and performing the additional mitigation.
4) IFA is in the process of obtaining an executed I-69 Section 5 Karst Agreement included in Attachment 7-2 with the permit agencies. Developer shall comply with karst agreement requirements as specified in Section 7.5.1.1.

7.4.1 Government Approval Submittals

For all Government Approvals that are Developer's responsibility, Developer shall submit complete draft applications to IFA for review and approval prior to submission to the permitting agency. IFA will provide comments on the completed draft applications within 14 days.

7.4.2 Governmental Approval Modifications

See Section 4.3 of the PPA for Developer's obligations with respect to modifications, renewals, and extensions of Governmental Approvals.

7.5 Environmental Requirements

7.5.1 Natural Resources

7.5.1.1 Karst Topography

Developer shall design, construct, operate, and maintain the Project in accordance with the Karst MOU, dated October 1993 and the I-69 Section 5 Karst Agreement, dated November 2013 included in Attachment 7-2. Where the Karst MOU and the I-69 Section 5 Karst Agreement included in Attachment 7-2 use the terms "INDOT", "INDOT maintenance staff", "its representative," or "its consultant," such references shall mean Developer, unless otherwise specified.

Developer shall not coordinate directly with the Karst MOU agencies, but shall work through IFA. IFA will provide Developer water quality sampling at selected karst springs for the Phase 1: Baseline Sampling work identified in the I-69 Section 5 Karst Monitoring and Maintenance Plan, as described in Attachment 7-2. Developer shall be responsible for water quality sampling for the Phase 2: Sampling During Construction and Phase 3: Sampling Post Construction work identified in the I-69 Section 5 Karst Monitoring and Maintenance Plan, as described in Attachment 7-2.

Developer shall designate a Cave Fauna expert approved by IFA.

In areas of identified karst features as indicated in Attachment 7-2, Developer shall provide Design Documents with karst features and proposed treatments clearly identified to IFA for review and approval. IFA will forward the Design Documents and supporting karst documentation to the IDNR, IDEM, and USFWS for concurrent review. Developer shall attend all requested field review meetings with the IFA and the resource agencies to expedite the approval process. Developer will address IFA-provided written comments to IFA's satisfaction prior to construction of any Karst Feature Treatment Work in karst feature locations.

All karst deliverables to be provided to the IDNR, IDEM, and USFWS shall be submitted in advance to IFA for review and approval. IFA will submit all Developer-provided deliverables to the IDNR, IDEM, and USFWS for their review. IFA will provide comments on the karst deliverables within 14 days. The Developer will address IFA-provided written comments to IFA's satisfaction.

If previously unidentified karst features are discovered during construction, all work shall stop within 100 feet of the feature and the Developer shall notify IFA designated karst personnel immediately. Developer shall install appropriate measures to prevent the discharge of construction related pollutants, including sediment, to the karst features. IFA will then coordinate with the IDNR, IDEM, and USFWS prior to approval of the Developer-proposed treatment measures to be incorporated for the feature. Work shall not resume within 100 feet of the feature until directed by IFA. See Section 15.7.10 of the PPA to determine if proposed treatment measures at previously unidentified karst features are eligible Extra Work Costs

7.5.1.2 Groundwater

Developer shall include the Standard Specifications for temporary and permanent erosion and sediment control measures in its Design Documents. Developer shall also include protection measures for that portion of the Project where groundwater from private, individual wells is the principal source of potable water. Protection measures shall include permanently grassed swales or equivalent methods to divert stormwater from the road to ditches and streams, and construction methods to reduce turbidity that construction temporarily causes.

7.5.1.3 Surface Water

Developer shall include measures to control and minimize on-Site water in a way that minimizes erosion while limiting water quality impacts from construction activities related to the Project. Developer shall include Best Management Practices (BMPs), standard erosion and sediment control measures, permanent water quality methods and other measures included in the Department Standard Specifications and Recurring Special Provisions.

The Developer shall perform all Work in compliance with Major Environmental Approvals and Governmental Approvals, including the Section 401/404 permit and conditions to minimize impacts to surface water quality.

7.5.1.4 Aquatic Biota

Developer shall comply with the following stipulations:

All construction equipment used in the Project shall be free of zebra mussel (Dreissena polymorpha) adults and veligers. Any construction equipment that has been used in waters that could have been infested with zebra mussels (within the last two weeks) shall be thoroughly cleaned at an off-Site maintenance, storage, or disposal facility.

Thorough cleaning at an off-site facility shall require removal of all soil, vegetation, rocks, sand, shells, and other debris from the equipment by one of the following methods:

Option 1: Power spray the entire surface of the equipment with hot water at a minimum temperature of 60 degrees Celsius for a minimum continuous duration of 5 minutes.

Option 2: Power spray the entire surface of the equipment with steam at a minimum temperature greater than 100 degrees Celsius for a minimum continuous duration of 5 minutes.

After cleaning as described above, the equipment shall be disinfected using a sodium hypochlorite (chlorine bleach) solution. The solution shall be mixed at a ratio of 1 part bleach per 50 parts water. All exposed surfaces shall be sprayed with the solution. The solution shall be disposed of in accordance with all applicable state and federal regulations. The equipment shall then be allowed to air dry for a minimum of 14 days prior to entry and use on the Project.

7.5.1.5 Wetlands and Waters of the United States

The Project includes permanent and temporary impacts to wetlands, wetland areas, and waterways. The impacted wetland areas are summarized in the Project Environmental Approvals. IFA will provide waterway and wetland mitigation for the impacts described in the IFA-Provided Approvals. After finalizing design and obtaining any needed modifications or amendments to Governmental Approvals, the Developer shall be responsible for the installation and continued maintenance of temporary protective fencing and prohibitive signing adjacent to wetland areas prior to construction. The temporary protective fencing shall be installed along the limits of the disturbance adjacent to jurisdictional streams, wetland and other water bodies. All Developer and Contractor personnel shall be made aware of all designated protection areas.

The Developer shall perform all Work in wetlands, wetland areas, and waterways in compliance with Major Environmental Approvals and Governmental Approvals, including the Section 401/404 permit and conditions.

7.5.1.6 Impacts to Wetlands and Waterways

The Department is in the process of obtaining IFA-Provided Approvals that minimize or prevent disturbance or damage to existing waterways and wetland areas. Developer shall further avoid and minimize impacts to wetlands and streams in the development of the Design Documents and during Construction Work. The following stipulations shall be adhered to:

1. Developer shall not impact any wetland area or waterway, whether it is permanent or temporary, unless that impact is addressed and approved as an authorized action by the appropriate federal and, as applicable, state regulatory agency in a Governmental Approval or permit modification.

2. IFA shall be immediately notified of inadvertent impacts to wetlands or waterways for which activities are not permitted. Areas shall be immediately restored to the full satisfaction of IFA and the appropriate environmental regulatory agencies. The cost of restoration and, as applicable, mitigation of any inadvertent impacted areas shall be the sole responsibility of Developer. If permit modifications and additional mitigation are required, the anticipated wetland mitigation ratios are as follows:

- Forested & Scrub-Shrub Wetlands — 3:1 based on area impacted
- Emergent & Aquatic Bed Wetlands — 2:1 based on area impacted
- Unconsolidated Bottom Wetlands — 1:1 based on area impacted
- Streams — 1:1 based on linear footage impacted

7.5.1.7 Best Management Practices for Work in Wetlands, Waterways, Karst Features and 100-Year Floodplains

Developer shall perform all Work in wetlands, waterways, karst features, and 100-year floodplains in compliance with Major Environmental Approvals and Governmental Approvals including the Section 401/404 permit and conditions, the CIF permit and conditions, the Karst MOU, and the I-69 Section 5 Karst Agreement including the Monitoring and Maintenance Plan.

Developer shall follow the Best Management Practices (BMPs) listed below for stream protection in place during Project construction. The Department's Standard Specifications, Special Provisions, and the Technical Provisions shall govern construction activities to control erosion and subsequent water pollution.

BMPs shall be used to prevent non-point source pollution, to control stormwater runoff, and to minimize sediment damage to water quality and aquatic habitats. The following BMPs, among others, shall be implemented:

1. Developer shall not stockpile or store excess fill, construction material, equipment, or debris in wetlands, waterways, wetland buffers, or any 100-year floodplains unless authorized by the Project Governmental Approvals. Developer shall not place materials in a location or manner that adversely impacts surface or subsurface water flow into or out of wetlands, waterways, or any 100-year floodplains.

2. Developer shall not use excavated material as backfill if it contains waste metal products, unsightly debris, and toxic material or any other deleterious substance unless authorized by the Project Governmental Approvals. If additional backfill is required, Developer shall use clean materials that are free of waste metal products, debris, toxic material, asphalt, or any other deleterious substance.

3. Developer shall not operate equipment in a manner that will damage wetlands, waterways or any 100-year floodplains unless authorized by the Project Governmental Approvals.

4. Developer shall repair and maintain any serviceable structure or fill so there is no temporary or permanent loss of wetlands, waterways, the 100-year floodplains, or temporary or permanent modification to any 100-year floodplains in excess of that allowed under permit unless authorized by the Project Governmental Approvals.

5. Developer shall limit the physical disturbance of waterways and riparian vegetation to only that which is necessary and authorized by the Project Governmental Approvals.

6. Notes and details shall be included in the plans to further minimize the removal of trees and understory vegetation that fall within the required Project ROW but outside the actual limits of construction. Hollow trees, trees with sloughing bark, and other large trees that are dead or alive and occur within the Project Limits shall be avoided to the maximum practical extent and delineated by special notes in the Plans and by "flagging" on-site.

7. Developer shall permanently revegetate all bare and disturbed areas with a mixture of native grasses, sedges, wildflowers, and native shrub and hardwood tree species. When revegetating sites, the Developer shall take into consideration site specific water quality and karst protection.

8. Developer shall seed and protect all disturbed slopes that are 3:1 or steeper with biodegradable erosion control blankets in accordance with Standard Specifications, manufacturer's recommendations, and all the Project Governmental Approvals.

9. Staging, refueling, and cleanup areas shall not be allowed within a minimum distance of 200 feet from streams, wetlands, other water bodies, and karst features in accordance with requirements of Project Governmental Approvals. Equipment cleaning/staging areas shall be located such that runoff from these areas shall not directly enter streams, wetlands, other water bodies, and karst features. Equipment cleaning/staging areas shall be located such that effluent shall be filtered through vegetated areas and proper sediment control structures located between the staging area and receiving water bodies, thereby minimizing the potential impacts such as sedimentation and pollution.

10. The size, shape, and stability of natural stream channels unavoidably impacted by construction shall be used as the basis for designing replacement channels. Work in the low-water channel of existing streams shall be minimized to the maximum practicable extent by limiting construction to the placement of required drainage structures or structure components such as piers, pilings, footings, cofferdams, the shaping of spill slopes around bridge abutments, and the placement of riprap. Newly created stream channels shall be stabilized with vegetation prior to water being diverted from the original stream channel (or diversion measure).

11. Fording of streams shall not be allowed unless authorized by the Project Governmental Approvals. Temporary bridges or other structures shall be used in accordance with Project Governmental Approvals. Unless otherwise approved in writing by the Engineer, and upon the receipt of any required Project Governmental Approvals, mechanical equipment shall not be allowed to enter or operate in streams, wetlands, and other water bodies. Only non-erodible materials shall be permitted to be placed in temporary crossings in accordance with Project Governmental Approvals. Natural channel design features shall be permitted in streams during Construction Work and only in accordance with Project Governmental Approvals. The Developer shall completely remove any temporary construction access built near streams, wetlands, and other water bodies in conjunction with this Project upon the completion of Construction Work.

12. Developer shall prevent downstream siltation during cofferdam dewatering. Pollutants such as fuels, lubricants, bitumen, raw sewage, and other harmful materials shall not be discharged into or near rivers, streams, and impoundments, or into natural or manmade channels leading thereto. Washwater or waste from concrete mixing operations shall not be allowed to enter any streams, wetlands, other water bodies, and karst features. The use of artificial bank stabilization such as riprap shall be limited unless otherwise required by Final Design details. Avoid channel alternations below the ordinary high water mark (OHWM) elevation to maintain habitat for aquatic organisms.

13. If piers are placed within the floodplain as required by structural design, impacts to drainage within the floodplain shall be minimized. Installation of riprap will be limited to areas necessary to protect the integrity of structures being installed. If riprap is required, it shall be installed outside the thalweg and between the toe of slope and the OHWM where possible.

7.5.1.8 Temporary Impacts to Streams, Wetlands, and Floodplains

The Project may have temporary stream impacts during Construction Work. Temporary impacts are defined as regulated activity, typically fill that is intentionally placed within jurisdictional waterways for construction purposes and that is of an impermanent nature. Developer shall restore the temporarily affected area to preconstruction conditions or in accordance with the Released for Construction Design corresponding to the time when the Developer ceases use of the temporarily impacted area or prior to expiration of the permit authorizing the temporary impact, whichever occurs first. Additional stream stabilization measures may be required to ensure the stability of the restored section and as required by Government Agencies. Developer shall limit temporary stream impacts to those impacts authorized by the Project Governmental Approvals.

The restoration of temporarily impacted streams to preconstruction vegetation, topography, and hydrology shall be performed by Developer.

The streams with anticipated temporary impacts are provided in the IFA-provided permits. The specific location of the anticipated temporary stream impacts are provided in the tables in the Section 401 and Section 404 IFA-Provided Approvals submitted by IFA. Earthen materials shall not be used for temporary stream diversions, stream crossings, or cofferdams due to the potential for washout during storm events and downstream sediment deposition (unauthorized fill) resulting from erosion. All temporary fill material shall be of a non-erosive nature.

7.5.1.9 Temporary Impacts - Stream, Wetland, and Floodplain Restoration Efforts

Some restoration plans will already be dictated by waterway IFA-Provided Approvals. Developer shall be responsible for final design and construction of all stream and wetland restoration required by the Project Governmental Approvals and Technical Provisions. The following elements shall be incorporated into restoration for additional work proposed by Developer.

1. Removal of all construction and temporary fill material.
2. Use of timber mats or similar materials when working within wetland areas to prevent soil compaction.
3. Deconsolidation and, as applicable, scarification of compacted soils.
4. Replacement of topsoil and, as applicable, organic matter lost to erosion and sediment control measures.
5. Reestablishment of grades to preconstruction conditions.
6. Removal of temporary stream crossings, pump-arounds, and/or causeways.
7. Restoration of stream banks with woody vegetation.
8. Replant any area within 50 feet of a streambank that was disturbed temporarily and that was vegetated preconstruction with native vegetation similar to preconstruction species composition, with the exception of utility corridors.

IFA will monitor the restoration of temporary impacts for compliance with requirements and conditions of Project Governmental Approvals. Additional remediation efforts shall be

implemented by Developer if it is determined necessary, following the completion of the monitoring period as presented in the Project Governmental Approvals. Developer shall immediately notify IFA of any potential lost resource to enable notification of the permit agencies and identification of appropriate corrective actions. Any required corrective action plan requested by permit agencies shall be the responsibility of the Developer.

For any stormwater management pond constructed in the vicinity of a stream, the pond shall be located a sufficient distance from the stream to maintain a 15-foot-wide cleared area beyond the toe of any berms surrounding the pond, plus an additional 30-foot-wide, or larger, vegetated buffer along the stream.

Developer shall place “Do Not Mow or Spray Mitigation Area” signs with the ECM’s contact information every 150 feet along the Project ROW for areas of stream and wetland restoration. These signs shall be maintained during construction and throughout the Operating Period.

The Developer shall place “Notice Waters of the U.S.” temporary signs on both sides of all jurisdictional “Waters of the US” within the Project Limits as identified in the Section 401/404 permit application. The signs shall be placed every 200 linear feet measured along the channel on each side of the jurisdictional Waters of the US facing the adjacent land to identify these waters to all approaching construction equipment. The Developer shall install the signs prior to the start of any earth disturbing activity and maintain them throughout the duration of the Construction Work. The “Notice Waters of the U.S.” temporary signs shall be lettered in contrasting colors to the sign background and sized to meet minimum requirements.

7.5.1.10 Avoidance and Minimization

Developer shall focus its efforts to continue to minimize impacts to wetlands, waterways, floodplains, parks, karst features, and forest in all areas of the Project. Developer shall focus its efforts to maximize reductions in the quantities of riprap by considering other bank stabilization materials including bio-engineering techniques to provide natural armoring placed in stream channels. Engineering designs shall continue to emphasize the avoidance and minimization of impacts as the feasibility and effectiveness of using measures such as retaining walls, steeper fill slopes, increased headwall heights, reduced roadway sections, and any other feasible minimization efforts are evaluated. Soil bioengineering techniques for bank stabilization will be considered where situations allow. Developer shall avoid disturbance to riparian vegetation, particularly within 50 feet of stream banks, unless impacts were included in Project Governmental Approvals. Developer shall acquire necessary amendments to Environmental Approvals if additional wetland and stream impacts cannot be avoided beyond what is included in the Project Environmental Approvals. IFA will provide waterway and wetland mitigation for the impacts described in the IFA-Provided Approvals. Developer shall be responsible for any additional mitigation requirements associated with additional impacts to streams, wetlands, and other water bodies in accordance with Sections 4.3 through 4.5 of the PPA.

Developer shall park, service, and maintain equipment in designated areas as approved by IFA. These areas shall be located away from all existing streams, streambeds, sinkholes, other environmentally sensitive areas, and their immediate watersheds.

Prior to construction, parking, and turning areas for heavy equipment outside the construction limits but within the Project Right of Way shall be identified and located to minimize soil erosion, tree clearing, and impacts to other identified resources.

All servicing of construction equipment will take place in a designated maintenance area away from environmentally-sensitive areas, such as streams, wetlands, karst features, and historic resources.

7.5.2 Reforestation

7.5.2.1 Forest Impact Avoidance and Minimization

Developer shall use Good Industry Practice to minimize the cutting or clearing of trees. IFA has obtained environmental approvals to clear trees within the Project Right of Way. Developer shall complete all Work within the Project ROW and keep tree clearing and snag removals to a minimum and limited to within the construction limits and time-of-year restriction requirements.

7.5.2.2 Forest Mitigation

Developer shall revegetate all disturbed areas within the Project ROW. IFA will be responsible for forest mitigation associated with the IFA-provided Project ROW excluding Developer impacts to any areas designated as “Do Not Disturb.”

1. IFA will provide for all riparian forest mitigation described in the IFA Provided Approvals, unless specified elsewhere in this Section 7.
2. Developer shall prepare and submit to IFA calculations of forest, wetland, and stream impacts based on the Final Design.

Developer shall limit the clearing of trees to within the Project Right of Way or be responsible for preparing an Indiana Reforestation Mitigation Plan and the additional mitigation.

7.5.3 Terrestrial Wildlife

7.5.3.1 Terrestrial Wildlife Avoidance and Minimization

Developer shall place “Do Not Disturb” signs at intervals of 250 feet at the construction zone boundaries of the Project. These signs shall be placed a minimum of 5 feet beyond the construction limits to protect re-vegetation areas and areas of existing vegetation. Trees that occur within the Project ROW, but outside of the construction limits, shall be identified during the design phase and delineated by fencing or other measures to minimize impacts.

Developer shall place “Do Not Mow or Spray Mitigation Area” signs every 150 feet along the Project ROW for areas of woody re-vegetation, wetlands, and the preservation of existing woody vegetation in accordance with the Department Standard Specifications.

Developer shall incorporate invasive-free mulches, topsoil and seed mixtures, and eradication strategies to eliminate known invasive species into the Project. The known invasive species list can be found on the IDNR website (http://www.in.gov/dnr/3123.htm).

Developer shall maintain wildlife movements and landscape connectivity between the six existing wildlife crossings to the extent feasible. To promote maintenance of aquatic communities and to allow deer and other wildlife movement, natural bottoms shall be provided in the bottom of the wildlife passages where feasible.

Culverts shall provide natural bottom substrates and a smooth bed transition from upstream to downstream allowing for reptile and amphibian crossing as well as fish movement. The Developer shall provide protection for wildlife by installing wildlife and small animal exclusion fencing in appropriate areas along the highway.

If riprap is determined necessary on the floodplain floor under any bridges, the riprap shall be buried with material that is accepted by IFA in its good faith discretion and easily traversable by wildlife. In addition, the use of slope protection under bridges shall be minimized to retain as much of the natural terrain as possible for wildlife movement and to minimize the disturbance of earthwork in the vicinity of streams. If riprap is needed for energy dissipation at either end of a stream culvert or to protect a buried utility, riprap and stream substrate material shall be placed together to establish a stream invert elevation that will not impede fish passage during low flows.

7.5.4 Endangered, Threatened, and Rare Species

7.5.4.1 Endangered, Threatened, and Rare Species Time-of-Year Restrictions

Developer shall not cut any trees suitable for Indiana bat roosting (3 inches or more in diameter at breast height, living or dead, with loose hanging bark) from April 1 through November 15 within the Winter Action Area (WAA), and from April 1 through September 30 within the Summer Action Area (SAA).

Developer shall only perform tree clearing in the WAA from November 16 to March 31 and from October 1 through March 31 in the SAA.

7.5.4.2 Endangered, Threatened, and Rare Species Avoidance and Minimization

The latest list of endangered, threatened, and rare species for Morgan and Monroe Counties can be found on the IDNR website (http://www.in.gov/dnr/naturepreserve/4666.htm).

The following mitigation measures shall be implemented for the Project:

- Developer shall minimize construction limits.
- Developer shall not perform nighttime construction work from 9 p.m. to 6 a.m. at stream crossings, with the exception of pouring concrete for bridge decks.
- Developer shall avoid impacting trees 3 inches or more in diameter at breast height, living or dead, with loose hanging bark except those in the direct construction limits.
- Developer shall contact IFA at least two weeks prior to the start of construction. IFA will contact the USFWS at least one week prior to the start of construction for the proposed Project.
- Developer shall conduct the pouring of concrete for piers and, as applicable, bridge decks such that spills into the stream do not occur. In the unforeseen event that spillage does occur, Developer shall notify IFA, who will initiate coordination with the USACE, USFWS office, IDEM, and the Engineer shall halt the activity immediately and not resume until appropriate remedial actions have been implemented.

7.5.4.3 Bat Reporting and Handling

Developer shall immediately report the discovery of any dead bat located within the construction limits, Project Right of Way, staging areas, or mitigation areas, regardless of species, to USFWS Bloomington Field Office, (BFO), at (812) 334-4261, subsequently transported, frozen or on ice, to BFO. All Work within a 200-foot radius of the point where the dead bat was discovered shall stop immediately, and the Developer shall notify IFA designated personnel immediately. Work shall not resume within this 200-foot radius until directed by IFA.

Developer shall make no attempt to handle any live bat, regardless of its condition. Report bats that appear to be sick or injured to BFO.

The BFO will make a species determination of any dead or moribund bats. If an Indiana bat is identified, BFO will contact the appropriate service or law enforcement office as required.

7.5.4.4 Eagle Reporting and Handling

Developer shall immediately report the discovery of any dead bald or golden eagle located within the construction limits, Project Right of Way, staging areas, or mitigation areas of the Project, to USFWS, BFO, at (812) 334-4261, and subsequently transported, frozen or on ice, to BFO.

Any sick or injured bald or golden eagle located within the construction limits, Project Right of Way, rest stops, or mitigation areas of the Project shall be immediately reported to BFO and an Indiana Conservation Officer, or the State Police if outside of normal business hours or on weekends.

If possible, attempts shall be made to remove an injured eagle from harm's way, until a trained person arrives to safely capture and transport the bird. Sick and injured eagles shall be transported to a veterinarian or a rehabilitation center that has a valid Federal permit to treat and rehabilitate eagles.

7.6 Cultural Resources

If, during the implementation of the Project, any previously unidentified archaeological site is discovered or a previously identified historic property is affected in an unanticipated manner, work within 100 feet around the area shall cease and reasonable measures shall be implemented to avoid harm. The Developer is responsible to ensure that INDOT's Cultural Resources Office (INDOT-CRO), FHWA, IN SHPO, and other parties, including Native American Tribes, if deemed appropriate by FHWA, are consulted within 48 hours of the discovery, an on-Site evaluation is conducted and a Treatment Plan(s) is developed, as needed. If the find is determined not to be eligible for the NRHP, ground-disturbing work may continue. If any archaeological resources are identified during construction monitoring, the find is to be treated in accordance with this stipulation.

IFA has completed Cemetery Development Plans and coordinated with SHPO for the following five cemeteries: Griffith, Carlton Huff, New Simpson Chapel, and Stitt Maxwell. Developer shall work within the Project Right of Way and comply with the conditions defined in the Cemetery Development Plan SHPO Concurrence letters dated October 2013 or be responsible for the Cemetery Development Plans, coordination with SHPO, and the additional mitigation. See RID 07.8 (Cemetery Development Plans, filenames 2013 10-08 SHPO***.pdf and 2013 10-

09 SHPO***.pdf) for the list of conditions the Developer shall comply with. If Developer discovers buried human remains, artifacts or burial objects within the Project Right of Way the Developer shall notify IFA personnel immediately.

1. IFA will conduct the required archaeology surveys within the Project Right of Way including the Phase II surveys as recommended. Developer shall work within the Project Right of Way or be responsible for the archaeology surveys and the additional mitigation.

7.7 Noise Barrier and Noise Attenuation

Barriers at three locations within the Project limits (west side of I-69 at Tapp Rd., east side of I-69 at SR 45, and SR 48/3rd Street) meet INDOT's Noise Policy guidelines of being reasonable and feasible and require noise abatement. Developer shall be responsible for the design and construction of all required noise walls in accordance with INDOT Noise Policy guidelines and shall coordinate the design with the affected communities for their input prior to construction. The Developer shall comply with INDOT Noise Policy guidelines with any design modifications. Where feasible, Developer shall complete noise barrier construction early in the construction of the Project to mitigate other construction noise.

The structural design of noise barriers shall conform to Section 14 (Structures).

7.8 Blasting Operations and Construction Vibration

Developer shall control vibrations due to blasting or other Work to avoid damage to structures or other property, including historic structures, karst hydrology, and monitoring systems for hazardous materials sites.

Developer shall develop a Blasting Plan and Vibration Monitoring Plans as specified in Section 13 (Geotechnical). The Blasting Plan and Vibration Monitoring Plans shall be developed for the following properties and structures:

- Daniel Stout House
- Maple Grove Road Rural Historic District
- Monroe County Bridge No. 83
- Stipp-Bender Farmstead
- Maurice Head House
- North Clear Creek Historic Landscape District
- Hunter Valley Historic Landscape District
- Reed Historic Landscape District
- Monroe County Bridge No. 913
- Morgan County Bridge No. 161
- Morgan County Bridge No. 224
- I U Health Bloomington (2620 Cota Drive)

In addition to the requirements in Section 13, the blasting plan and vibration monitoring plans shall include the following:

- Developer shall have a historic professional evaluate the condition of all structures prior to the occurrence of any blasting. The blasting Contractor, in consultation with a historic professional, shall make a determination if a structure is fragile.

- Developer's historic professional shall make the determination whether damage has occurred to structures or other property as a result of Project activities. Developer shall provide a written report based on its historic professional's recommendations indicating the specific structures and properties that have been damaged due to construction activities and detailing the extent of the damage to each structure.
- Developer shall be responsible for the repair of any damage to structures or other property caused by the Developer's Work. Repairs to historic structures shall be coordinated in advance with the Indiana State Historic Preservation Officer (SHPO) to ensure the repairs are carried out in accordance with the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (Secretary's Standards).
- Developer shall conduct all blasting in the Winter Action Area (WAA) in a manner to avoid compromising the structural integrity or altering the karst hydrology of nearby caves serving as Indiana bat hibernacula.
- Developer shall not be allowed to blast adjacent to Hazardous Materials superfund sites including Lemon Lane Landfill (HM-7) and Bennett Stone Quarry (HM-11) to prevent damage to the monitoring systems.
- Developer shall notify representatives of I U Health Bloomington a minimum of seven days prior to the start of blasting within 1 mile of their facilities.

7.9 Hazardous Materials

Developer shall apply the following provisions to the spillage or release of Hazardous Materials during the construction of the Project. Known hazardous materials sites have been identified as follows:

- C & H Stone (HM-1)*
- Sam's Club (HM-2)**
- Coca Cola Bottling Facility (HM-3)
- Kmart Parking Lot (HM-4)
- Former Amoco Unit #10116 (HM-5)
- Former Marathon Unit #2572 (HM-6)
- Lemon Lane Landfill (HM-7)*
- Hanna Trucking/United Rentals – Dave Omara Contractor Inc. (HM-8)
- Sturgis Auto Salvage (HM-9)**
- Dotlich Crane Service (HM-10)*
- Bennett Stone Quarry – aka Bennett's Dump (HM-11)*
- INDOT Sub-District Maintenance Facility (HM-12)
- Hoosier Energy (HM-13)**
- Johnson Oil Bigfoot #071 - aka BP Circle K (HM-14)**
- Bloomington Auto Parts (HM-15)**
  * Phase I ESA recommended location
  ** Phase II ESA recommended location
  *** Superfund site

Developer shall submit Design Documents in the areas of known hazardous sites to IFA for review and approval. In the event that avoidance of potential residual contamination or a migration route cannot be confirmed during final design, the Developer shall complete the necessary Environmental Site Assessments. [IFA is in the process of obtaining additional ESA data for the project which will be provided to proposers in future RFP updates.]

The following provisions shall apply to the spillage or release of Hazardous Materials during the construction or operation of the Indiana portion of the Project:

- Construction Work: Hazardous Material releases, oil spills, fish/animal kills, and radiological incidents shall be reported to the Indiana Department of Environmental Management (IDEM) Office of Emergency Response (OER), at (888) 233-7745. This shall occur as soon as action has been taken to either contain/control the extent of the release, or protect persons, animals, or fish from harm or further harm. Appropriate response actions for spills occurring on Project Sites, in order, are as follows:
- Identify the spilled material from a safe distance.
- Contain the spilled material or block/restrict its flow using absorbent booms/pillows, dirt, sand or by other available means.
- Cordon off the area of the spill.
- Deny entry to the cordoned off area to all but response personnel.
- Contact OER/IDEM, then Operations Support.
- Operations: INDOT *Hazardous Material Accidents/Incidents Policy*, February 1992 (revised July 1998 or most recent version)

7.9.1 Hazardous Materials Management Plan

Developer shall prepare a Hazardous Materials Management Plan, which is a component part of the PMP, and submit it to IFA in accordance with Attachment 1-1, at least two weeks prior to the initiation of Construction Work for review and approval. The Hazardous Materials Management Plan shall include the following contents at a minimum:

- Responsible Personnel
- Spill Reporting
- Project and Site Information
- Potential Spill Sources
- Spill Prevention and Response Training
- Spill containment
- Spill Prevention
- Spill Response
- Project Site Map
- Spill Report Form(s)

7.10 Air Quality

The Developer shall maintain construction equipment in proper mechanical condition. MSAT and diesel emission reduction strategies shall be considered to limit the amount of diesel emissions from construction equipment, such as limiting idling times, or reducing the number of trips. Fugitive dust generated during land clearing and demolition procedures will be controlled in accordance with INDOT's Standard Specifications including vegetative cover, mulch, spray-on adhesive, calcium chloride application, water sprinkling, stone, tillage, wind barriers, and construction of a temporary gravel entrance/exit to the construction Site.

7.11 Sustainability Management Plan

The Project shall be delivered and maintained in a manner that reflects the following sustainability elements the project is safe and secure, provides long term security, improves

mobility, optimizes life-cycle costs, provides economic opportunity, protects and conserves environmental resources, and provides for proactive engagement with the public.

The Developer shall submit a Sustainability Management Plan to IFA for review and approval. The Sustainability Management Plan shall be a component part of the PMP. The Sustainability Management Plan shall demonstrate how the Developer plans on addressing the sustainability goals and objectives of the Project during both performance of the Construction Work and the Operating Period.

The Sustainability Management Plan shall address the following sustainability goals and objectives:

- Safety
  - Maintain a safe environment for the public and workers.
- Optimize life-cycle costs
  - Use durable materials.
  - Use recyclable materials.
  - Minimize waste.
  - Consider the impact of ice and snow control materials.
- Provide economic opportunity
  - Achieve diverse workforce goals.
  - Create DBE, small business opportunities and subcontracting.
  - Consider the source of materials based on sustainability principals.
- Protects and conserve environmental resources
  - Use of recycled, recyclable, and waste materials.
  - Use of green infrastructure stormwater management design principles.
  - Protect, conserve and enhance all environmentally sensitive areas.
  - Minimize and eliminate waste.
  - Optimize energy efficiency in construction and operations.
- Improve mobility
  - Consider access along multi-use paths and bicycle facilities.
  - Provide and enhance level of service.
- Proactive engagement with the public
  - Communicate the goals and achievements of the sustainability plan with the public.
  - Include sustainability goals, efforts and activities in the Public Involvement Plan.

The Sustainability Management Plan shall include:

- Measurable standards and performance measures to demonstrate that the Developer is meeting the sustainability goals and objectives;
- Means to remedy deviations from the goals and objectives;
- An organizational structure which sets out the roles and responsibilities of Developer's team members as they relate to sustainability;

- A quarterly reporting and tracking mechanism during construction and operations respectively; and,
- An accepted methodology for evaluation of the performance of the Sustainability Management Plan such as INVEST ("Infrastructure Voluntary Evaluation Sustainability Tool"), Greenroads, or GreenLITES.

The Sustainability Management Plan shall distinguish between the requirements for the Construction Work and the Operating Period. Developer shall update the Sustainability Management Plan every five years during the Operating Period to enable application of new Best Management Practice and which update shall be completed in accordance with the requirements set forth in this Section. The revised Sustainability Management Plan and all subsequent updates shall address all operations and maintenance activities including Rehabilitation Work.

7.12 Construction Noise

Disturbance to local residents due to Construction Work operations shall be in accordance with Section 7.7, FHWA *Construction and Noise Handbook (FHWA-HEP-06-015),* and state and laws.

Within the City of Bloomington, the following restriction applies:

Activities that produce unreasonable noise as defined by City of Bloomington Ordinance Chapter 14.09 (Noise Control) are prohibited between 10 p.m. and 6 a.m. Prohibited activities include:

- Pile driving
- Drilling, blasting
- Use of pneumatic hammers
- Crushing operations
- Slamming of truck tailgates
- Demolition (excluding milling)

7.13 Environmentally Restricted and "Do Not Disturb" Zones

In addition to the requirements of the PPA Documents and Section 7, Developer shall be subject to the access and Work restrictions described below. See RID CAD folder 02 (CAD Data filename: 0300381-RD-B-EN01.dgn levels DND_1 through DND_9) for a graphical depiction of the "Do Not Disturb" zones. "Do Not Disturb" zones are areas within the Project in which the Developer shall not Work.

The work restrictions are based upon the assumption that all permits have been received. Therefore wetlands, streams, or other water bodies outside the Reference Design construction limits are considered to be restricted areas; and wetlands, streams, or other water bodies within the Reference Design construction limits are considered to be accessible for construction activities in accordance with the restrictions provided in the PPA Documents. All temporary and permanent impacts to jurisdictional streams will require pre-construction permits.

No work shall be performed within a jurisdictional stream from April 1 through June 30 without prior written approval of the IDNR Division of Fish and Wildlife.

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8 DRAINAGE

8.1 Standards and References

Design and construct the drainage Work in accordance with the applicable requirements of the PPA Documents, including Project Standards and this Section 8, Governmental Approvals, and applicable Laws.

8.2 Design Requirements

Developer shall design and construct surface drainage conveyance that ensures effective drainage as it relates to the design requirements for runoff generated within and/or that drains to the Project Limits. Developer shall maintain the existing drainage patterns unless approved by IFA. The surface drainage conveyances include but are not limited to storm sewer systems, inlets, culverts, roadside ditches, open channels, water quantity and quality devices, outlet protection, and energy dissipators. All drainage design and erosion control plans, as indicated herein, shall be submitted to IFA for Design Review. The Mainline drainage design shall meet freeway design standards.

All structures listed in the Culvert Inspection Reports located in the RID (DR 08.1 and 08.2) having an overall rating of 4 or less shall be replaced by Developer prior to Substantial Completion. Rating system shall be in accordance with the requirements of National Bridge Inspection Standards (NBIS) of the Code of Federal Regulations, 23 Highways – Part 650, the Department's *Bridge Inspection Manual*, and the FHWA *Bridge Inspector's Reference Manual.*

The Work shall meet the design requirements of Table 8–1 for the appropriate sections of the Project. These tables are only a summary of the design criteria and are not a comprehensive list of all design requirements. Developer shall verify all design requirements, which includes the criteria listed in Table 8–1 and Project Standards. Developer shall submit to IFA the drainage design criteria for the Project for approval with Stage 1 reviews.

Developer shall avoid directing stormwater toward karst features. Where redirecting storm water away from karst features is not feasible, Developer shall provide permanent water quality treatment upstream of outletting stormwater to the karst feature. Stormwater treatment shall be in accordance with the IDM, IDEM Indiana Stormwater Quality Manual or the 1993 Karst Memorandum of Understanding, or the 2013 I-69 Section 5 Karst Agreement, whichever is more restrictive. Stormwater runoff protection measures shall be installed at all karst features in the Project Right-of-Way at the initiation of construction and maintained until all stormwater is diverted from the feature or permanent stormwater treatment measures are in place.

Developer shall not increase stormwater runoff, directly or indirectly, to Lemon Lane Landfill/Illinois Central Spring Superfund site and Bennett's Stone Quarry Superfund site. The Lemon Lane Landfill site is located east of I-69, north of the CSX railroad, south of the Vernal Pike overpass. The Bennett's Stone Quarry is near the northwest corner of the interchange between I-69 and SR 46, south of Hunter Valley Road. Developer shall submit drainage plans for Work adjacent to or within the contributing drainage area of these sites from the Stage 1 Design to USEPA and IDEM for review and comment.

Developer shall not adversely impact the water quality or increase the quantity of runoff to any of the following: Hunter Valley Historic Landscape District, Reed Historic Landscape District, and North Clear Creek Historic Landscape District. Developer shall conduct a meeting with representatives of the aforementioned agencies and representatives from Monroe County, City of Bloomington, Indiana SHPO, INDOT Cultural Resources, FHWA and Section 106 consulting parties, as listed in Attachment 8-1 (Consulting Parties) , during the preliminary phases of design to solicit input on the drainage design and avoiding adverse impacts to these historic properties. Developer shall document the input from the meeting, address comments, and incorporate into the Work. Developer shall submit the documentation to IFA in report format.

Developer shall not direct any roadway runoff from the Project to karst features with hydrological connectivity to Indiana bat hibernacula.

Table 8–1: Design Summary

Design Criteria		Design Summary	Reference
Hydrologic Parameters	IDNR Coordinated Curves (If available)	Use for stream flow, culverts, and bridges. IDNR Letter of Discharge for all structures that require a Construction in a Floodway Permit (A discharge determination letter from IDNR is required if IDNR coordinated curves are not available and DNR Construction in a Floodway permit is required).	IDM Chapter 202 NOAA Atlas IDNR
	Rational Method	Use for storm sewers, inlets, roadside ditches, and culverts and if tributary area is: < 100 acres in urban setting < 200 acres in rural setting	
	NCRS (TR-20) Method/Program	Use for stream flow, culverts, and detention basins. (Tributary area > 100 acres and < 640 acres in an urban area. Tributary area > 200 acres and < 25 miles in rural area without DNR Construction in a Floodway requirement)	
	Refer to IDM Figure 202-3A for discharge selection criteria above		
	Time of Concentration	NRCS (TR-55)	
		Maximum sheet flow = 100 feet Min Tc = 5 minutes	
	Rainfall Data	Obtain from NOAA atlases. Use single gauge.	
	Hydrographs - HUFF Distribution	Use 50 percent probability HUFF Distribution 1st Quartile (6 hours or less) 2nd Quartile (6.1 hours to 12 hours) 3rd Quartile (12.1 hours to 24 hours) 4th Quartile (greater than 24 hrs)	
	Runoff Coefficients	IDM Table 202-2E	
	NRCS Curve Numbers	IDM Table 202-2F	

Design Criteria		Design Summary	Reference
Roadside Ditches (Open) Channels)	Design Storm	10 percent annual exceedance probability (EP). 1 percent EP to be run to ensure no encroachment on pavement	IDM Chapter 203 IDM Chapter 302 IDM Chapter 304
	Design Procedures	Manning's equation	
	Max. Allowable Velocity	Refer to IDM Figure 203-6A.	
	Freeboard	12 inches or 2 velocity heads (which ever criteria is greater)	
	Channel Slope Lining	10 percent EP for design. 1 percent EP as check for encroachment into travel lanes. < 1 percent = seeded channel 1 percent≤G<3 percent = sod lined channel ≥3 percent = paved channel 3 percent≤G≤10 percent = riprap lined channel 3 percent≤G≤15 percent = soil erosion matting All lining shall be confirmed using the lining selection methodology described in IDM 203-6.05.	
	Ditch Min. Radius	3 times bottom width from centerline of ditch/channel	
	Min. Longitudinal Grad.	0.3 percent minimum (0.5 percent desirable)	
	Side Slopes	2:1 max. for riprap lined channels 3:1 max outside of clear zone (30 feet off the EOP). 6:1 within clear zone (IDM Fig. 45-3A). Verify clear zone criteria with Roadway Specifications. Shall meet clear-zone requirements	
	Shape	4-ft min. flat bottom, except Mainline median ditches	
	Depth	Refer to underdrain criteria (IDM Section 52-10.0) and roadside or median ditch criteria (IDM Section 203-4.04(12)) to determine depth limits. IDM freeboard requirements also govern. The most restrictive criteria governs depth limits	
Culverts	Design Storm	1 percent EP	IDM Figure 203-2C Chapter 203 Chapter 303
	Allowable Velocities - Freeways, Ramps, Multi-Lane Non Freeways	2 percent EP	
	Allowable Velocities - Two Lane Facilities	2 percent EP for AADT ≥ 3000	
		4 percent EP for 3000 ≥ AADT≥1000 10 percent EP for AADT<1000	
	Allowable Vel. - Driveways	10 percent EP	
	Culvert Sizing Process	Refer to IDM 203-2.02 (12)	

Design Criteria		Design Summary	Reference
	Culvert Interior/Roughness	Two designs for each culvert using n = 0.012 and n = 0.024	
	Min. Size (Diameter)	36 in - Mainline or public road approach (≥3 lanes) 15 in - Public road approach (2 lanes) and drives	
	Alignment	45-degree skew maximum	
	Min. Cover (Top of Pipe to Bottom of Pavement)	1 foot for circular pipes 1.5 feet for deformed pipes 3-sided structures and boxes - cover to be examined per str. (1 foot min.)	
	Allowable Headwater	Refer to IDM 203-2.02(02)	
	Road Serviceability Freeboard	If design storm = 1 percent EP - 2 feet minimum difference between edge of pavement and headwater. If design storm < 1 percent EP - headwater not to exceed edge of pavement.	
	Minimum Velocity	3 ft/s (Refer to IDM 203-2.02(06))	
	Maximum Velocity and Outlet Protection	V < 6.5 ft/s - Revetment Riprap 6.5 ft/s ≤ V<10 ft/s - Class 1 Riprap 10 ft/s ≤ V<13 ft/s - Class 2 Riprap V≥13 ft/s - Use Energy Dissipator	
	Energy Dissipators	Refer to IDM Chapter 203-2.03(10)	
	Tailwater	Refer to IDM 203-2.03(03)	
	End Treatments	Refer to IDM 203-2.03(04)	
	Sumping	Refer to IDM 203-2.02(10) and IDM Figure 203-2E	
Spread Criteria	Freeways:	Design: 2 percent EP (Edge of travel lane)	IDM Figure 203-4A
	Multi-Lane Non-Freeways:	Design: 10 percent EP (Across 1/2 travel lane)	
	Two-Lane Facilities:	Design: 10 percent EP (4 ft of travel lane)	
	Bridge Non-Freeway: (V≥ 50 mph)	Design: 10 percent EP (Edge of travel lane)	
	Bridge Non-Freeway: (V< 50 mph)	Design: 10 percent EP (3 ft of travel lane)	
	Ramps (V≥ 50 mph):	Design: 10 percent EP (Edge of travel lane)	
	Ramps (V< 50 mph):	Design: 10 percent EP (3 ft of travel lane)	
Catch Basins/Inlets	Design	Match design and check storm events for storm sewers.	IDM Chapter 203
	Casting Types Drainage Structure Types	Refer to IDM Figure 203-4B and INDOT Standard Specifications	
	Max. Manhole Spacing	400 ft	

Design Criteria		Design Summary	Reference
	Inlet Location	Refer to IDM 203-4.04(02). Place structure prior to radius return on all curbs draining toward intersections and before flat spot in super rollover.	
	Inlet Spacing	Dependent on Roadway Spread Criteria (Refer to IDM 203-4.04(02)	
	Inlet at Low Point of Major Sag	2 percent EP rainfall and runby flow for design Construct Flanking Inlets (IDM 203-4.04(09))	
Storm Sewer Networks	Design Storm - Freeways	2 percent EP gravity flow and 2% EP HGL	
	Design Storm - Non-Freeways and Ramps	10 percent EP gravity flow and 2 percent EP HGL (50-yr for major sag point)	
	Minimum Size	12-in diameter	IDM Chap. 203-4.04(06)
	Minimum Slope	Slope to ensure 3.0 ft/s	
	Invert Elevations	Match pipe crowns or at least 80 percent of the diff. in pipe sizes, if possible.	IDM Chapter 203
	Min. Cover (Top of Pipe to Bottom of Pavement)	INDOT Standard Drawings	IDM Chapter 203
	Design Velocities	3.0 ft/s min. (flowing full) 10.0 ft/s max. (flowing full)	
Bridges	Bridge Waterway Opening Allowable Backwater	1 percent EP	IDM Chapter 203 IDM Chapter 404
	Bridge Waterway Opening Allowable Velocity	1 percent EP	
	Bridge Hydraulics	Refer to IDM 203-3.0	
	Bridge Deck Drainage	Refer to IDM 404-2.07 and IDM 203-4.04(16)	
	Scour Countermeasures	Refer to IDM 203-3.03(03)	
Pipe Material/Type	Type 1	Culvert under roadway	IDM Chap. 201 INDOT Standard Specs. 715.02
	Type 2	Storm pipe	
	Type 3	Culvert under drive or field entrance	
	Type 4	Underdrain or drain tile	
	Type 5	Broken-back pipe or other pipe installation requiring coupled pipes	
Storage Facilities (Water Quantity): Refer to Section 8.2.4 for further detailed information regarding this Design Criteria and IDM Chapter 203.			IDM Chapter 203 FEIS,

Developer shall submit signed and stamped Plans and drainage reports for all surface drainage conveyances and drainage structures for Design Review. The calculations and exhibits necessary for IFA review shall follow the submittal guidelines outlined in the IDM. Presented below is a list of additional design elements and requirements that shall be incorporated into the final Design Documents and Construction Documents:

1. Department Hydraulics may, at its discretion, require submittals of HY-8 computations for review of culverts or other small structures of less than 36 inches in diameter or equivalent size.

2. All newly installed culverts located along existing streams and waterways shall be in a sump condition, such that the bottom invert is a maximum of 2 feet lower than the stream bottom/bed. The design of the drainage structure/culvert shall allow natural stream bed material to accumulate throughout the length of the culvert. Sumping requirements shall follow the IDM.

3. Storm sewer median drain outlets shall be a minimum of 1.00 foot above the ditch flowline elevation.

4. All culverts and storm sewer outlets shall include outlet protection or energy dissipators. The design criteria for outlet protection and energy dissipators shall follow the IDM.

5. All roadside ditches and channels shall have proper channel lining installed to ensure stable and erosion-free ditches and channels. The types of lining include grass/seeded, sod, paved channel, rip-rap, or erosion matting. Channel lining for jurisdictional waterways shall comply with the applicable standards, regulations and permit conditions. Developer shall select the type of channel lining, first based on the slope of the ditch/channel as presented in Table 8-1 and the IDM. Once a lining selection has been made, Developer shall verify the lining stability following the procedures and calculations presented in the IDM.

6. For additional requirements for bridge deck drainage, refer to Section14.2.5.

7. Developer shall perform a joint stream probability analysis for waterways, per IDM Section 203-2.03 (03) for applicable locations.

8. Culverts and other devices shall be placed so they do not preclude the movement of fish and other aquatic organisms.

9. Developer shall identify culverts that can be oversized to allow for the passage of small fauna at locations where appropriate and reasonable. Developer shall coordinate incorporation of oversized culverts with all applicable agencies.

8.2.1 Structures and Culverts

Developer shall provide drainage structures to satisfy all of the drainage criteria and concerns as it relates to the Project and the design standards, Developer shall work through the permitting agencies to acquire the needed Governmental Approvals, in coordination with IFA. Developer shall submit signed and stamped plans and drainage reports for all drainage structures and culverts for Design Review. The following FEMA mapped streams will be crossed: Beanblossom Creek, Griffy Creek, Bryant Creek, Little Indian Creek, Jordan Creek, Buckner Branch of Little Indian Creek, and Indian Creek. Developer shall complete a hydraulic study to address the structure size and type for each crossing.

Existing multiple pipe culvert structures (at a single stream crossing) shall be replaced with a single structure at the following locations:

1. Unnamed tributary of Bryants Creek (approximately 1,100 feet south of the Bryants Creek crossing)

2. Unnamed tributary of Little Indian Creek (approximately 800 feet south of the Liberty Church Road interchange

8.2.2 Concept Drainage Report

Developer shall prepare a Concept Drainage Report to address all applicable items in the IDM, including all applicable storm sewer, BMPs, and other drainage items and requirements of the cities and counties. At a minimum, the report shall include:

1. Map/drawing showing each drainage area, clearly showing the details within each drainage area
2. Separate maps for existing and proposed conditions
3. Proposed stream realignments
4. Locations of all detention facilities, including points of inlet and outlet for these detention basins
5. Drainage boundaries for each drainage district clearly identified with a unique boundary color, allowing areas and runoff coefficients to be verified
6. Location of known karst features, and superfund sites
7. Tables showing detailed calculations of the following:
    a. Time of concentration based on flow length, flow regime (shallow concentrated, pipe, etc.), type of cover, and ground slope
    b. Area weighted runoff coefficient based on land use and acreage
    c. Selected rainfall intensity
    d. Design flows for each culvert, pipe, or stream crossing
    e. Culvert or pipe size

Developer shall submit a draft Concept Drainage Report to the IFA, for review and comment. Developer shall address comments and submit a final Concept Drainage Report to the IFA for approval. The Developer shall obtain approval of the final Concept Drainage Report before proceeding with design for the Stage 1 submittal as described in Section 3 (Design Quality Assurance, Quality Control, and Oversight).

8.2.3 Water Quantity (Detention) Requirements

Developer shall be responsible for ensuring that post-construction stormwater discharge does not cause an increase in potential for downstream flooding or property damage. The Developer shall follow the most stringent requirement from the Project Standards or local code for each location.

8.2.4 Water Quality

Developer shall be responsible for ensuring that runoff from bridges and roadways is collected and routed in accordance with Section 7.

8.2.5 Stream Crossings

8.2.5.1 Wildlife Passage

Developer shall coordinate with appropriate agencies to determine the most feasible and practical conservation measures for terrestrial wildlife passage. The following existing crossings shall provide for wildlife passage:

- Griffey Creek
- Bean Blossom Creek
- Bean Blossom Creek overflow
- Bryant Creek
- Little Indian Creek
- Jordan Creek

Developer shall provide fencing at the above locations to funnel wildlife under the bridges and away from Mainline. Developer shall coordinate with Department and IDNR on location and length of fencing required.

The area provided for wildlife passage shall not be armored with riprap.

For the locations listed above, the following clearance requirements shall apply:

- For bridges where the existing clearance envelope underneath the bridge is less than or equal to 8 feet high, Developer shall not reduce the height clearance, from shelf to low member of the bridge, from the existing condition. For bridges where the existing clearance envelope underneath the bridge is greater than 8 feet high, Developer may reduce the clearance, but not to less than 8 feet.
- For bridges where the existing width of the shelf underneath the bridge is less than or equal to 24 feet wide, Developer shall not reduce the width of the shelf from the existing condition. For bridges where the existing shelf is greater than 24 feet wide, Developer may reduce the shelf width, but not to less than 24 feet.

8.2.5.2 Stream Realignment

Developer shall minimize realignment of surface streams and impacts to geomorphology shall be avoided. Stream impacts and relocations cannot exceed the type and length as set in the 404/401 permit documents.

Developer shall minimize impacts to stream banks and channels, and shall avoid channel alterations below the ordinary high water mark (OHWM) elevation.

Other requirements:

- Limit the realigned length of channel to be realigned to the minimum necessary for bridge construction.
- If the channel substrate contains gravel, cobbles and boulders, Developer shall stockpile this material and reuse it for the new substrate.
- Construct realigned channel with bank slopes and bottom equivalent to those in the natural channel.
- Use BMPs to contain soil sediment runoff during construction of the realigned channel.

- Plant native hardwood trees and shrubs in a zone at least 50 feet wide on both sides of the realigned channel.

8.2.5.3 Streambed and Bank Armoring

Developer shall use bio-engineering techniques for armoring of stream banks. Installation of riprap shall be limited to areas necessary to protect the integrity of the structure and to prevent scour at culvert inlets and outlets. If riprap is required, Developer shall provide riprap between the toe of slope and the OHWM where possible.

Riprap shall not be installed below the OHWM such that it inhibits fish passage.

8.3 Erosion Control

8.3.1 Erosion Control Plans

Developer shall be responsible for developing Erosion Control Plans (ECPs) for all earth-disturbing activities, borrow areas, stockpiles, waste disposal areas, and the restoration of areas used for temporary impacts. The ECPs shall also include protection of private and individual water wells that are the source of potable water from receiving turbid and sediment laden runoff from the construction area. The ECPs shall be developed in conjunction with final Design Documents and Construction Documents. The ECPs shall be created to satisfy all design requirements presented in the IDM Chapter 205 (Temporary Erosion and Sediment Control), and Department Standard Specifications and Standards Drawings. The ECPs shall also be created to fulfill all IDEM Rule 5 permit requirements. The ECPs shall incorporate any pertinent information from Sections 5 and 7. Developer shall obtain acceptance of the ECPs by IFA, and Developer shall obtain the IDEM Rule 5 permit prior to any earth-disturbing activities. Developer shall amend the ECPs if any revisions to the ECPs take place during construction. Developer shall resubmit the amended ECPs to the appropriate authorities and IFA as described in the above mentioned design standards, specifications, and Governmental Approvals.

8.3.2 Erosion Control Supervisor

Developer shall designate one or more employees as an Erosion Control Supervisor (ECS). The Erosion Control Supervisor shall be a Certified Professional in Erosion and Sediment Control by EnviroCert International, Inc. The ECS shall be supported by a staff of at least one erosion control inspector. All inspectors shall have CESSWI or CISEC certification, or approved equal.

8.4 Construction Requirements

8.4.1 Storm Pipe

Developer shall specify storm pipe materials according to the Project Standards or approved equals. If Developer chooses to select a pipe material not specified per the Project Standards, Developer shall submit a design and construction alternative to IFA for review and its good faith approval with the RFC Design and Construction Documents stating the pipe material, its application, and at what location that pipe material will be constructed. Only after IFA has approved the pipe material can Developer consider it an approved equal.

All existing drainage structures that will no longer be used shall either be removed and disposed of off-Site and the trenches backfilled with structure backfill or shall remain in place and be filled

with flowable backfill. All existing drainage structures that are to remain in use within the Project ROW limits shall be examined and cleaned.

9 ROADWAY

9.1 Standards and References

Developer shall design and construct the roadway Work in accordance with the applicable requirements of the PPA Documents, including Project Standards and this Section 9; Governmental Approvals; and applicable Laws.

9.2 Reference Design

The Reference Design provided in the RID (RD 09.08) conveys the general intent of the Project, but it does not provide IFA design recommendations or IFA-approved design solutions for the Project. The Reference Design depicts the following elements that may not be changed:

1. Number and location of ramps, overpasses, underpasses, and interchanges as shown on the plan sheets.
2. Number of Interstate, state road, and local road through lanes as shown on the typical sections.
3. Lane, shoulder, and ramp widths as shown on the typical sections.
4. Median widths on Mainline and median widths outside ramp termini on State and local roadways as shown on the typical sections.
5. Project termini for I-69 Section 5 as shown on the plan sheets.

Adjustments to the Reference Design are allowed without IFA approval, provided the adjustments are consistent with the PPA Documents, Laws, Governmental Approvals, and meet the following requirements:

1. The adjustments do not result in the need to acquire additional Project ROW.
2. Developer shall not implement any adjustments that cause the proposed level of service (LOS) to fall below the minimum LOS specified in Section 11.9.1.4.

9.3 Design Requirements

See Attachments 9-1A and 9-1B for information on coordinate systems for the Project.

Developer shall not place any garages or other facilities necessary for the operation and maintenance of the roadway within the limited access Project ROW. Developer may request approval from IFA to use excess Project ROW for maintenance facilities.

The Specific Design Requirements listed for each roadway are the minimum requirements for the design of each roadway. The design shall not provide for less than minimum requirement unless written approval is obtained from IFA.

9.3.1 Project Limits

The Project Limits represent the minimum limits of Work for the Project, including temporary and incidental construction, except temporary traffic control devices. The Project Limits are defined below:

Table 9–1: Project Limits

Description	Approximate Limits
Mainline	
I-69	From 200 feet south of the intersection of That Road/SR 37 to the south bridge approach of the Indian Creek Bridge (Str. No. 37-55-3106)
New Interchanges with Ramps	
Fullerton Pike Interchange	Intersection of existing SR 37 and Fullerton Pike
Tapp Road Interchange	Intersection of existing SR 37 and Tapp Road
Sample Road Interchange	Intersection of existing SR 37 and Sample Road
Liberty Church Interchange	Approximately 500 feet south of the intersection of existing SR 37 and Liberty Church Road.
Existing Interchanges with Ramps	
SR 45/2nd Street Interchange	Interchange of existing SR 37 and SR 45/2nd Street.
SR 48/3rd Street Interchange	Interchange of existing SR 37 and SR 48/3rd Street
Walnut Street Interchange	Interchange of existing SR 37 and Walnut Street
SR 46 Interchange	Interchange of existing SR 37 and SR 46
State Roads (SR)	
SR 45 (Bloomfield Road)	From Liberty Drive (approx. Sta. 34+60 “S-SR45”) to intersection with S. Basswood Drive (approx. Sta. 64+15 “S-SR45”), excluding intersections with Liberty Drive and Basswood Drive
SR 48 (3rd Street/Whitehall Road)	From Franklin Drive (approx. Sta. 40+60 “S-SR48”) to North Gates Drive (approx. Sta. 58+00 “S-SR48”), excluding the intersections with Franklin Drive and North Gates Drive
SR 46	From SB Ramps to NB Ramps
Local Roads	
That Road (East)	From 800 feet West of Roy Bailey Drive (approx. Sta.10+80 “PR-S-That”) to Rockport Road (approx. Sta.32+84 “PR-S-That”)
That Road (West)	From Southeast Lane to Existing SR 37

Description	Approximate Limits
Rockport Road	From Fullerton Pike (approx. Sta.72+09 “PR-S-Rockport”) to 600 feet west of I-69 (approx. Sta. 44+20 “PR-S-Rockport”)
Fullerton Pike	From Rockport Road (approx. Sta. 74+00 “PR-S-Fullerton”) to Sharon Drive (approx. Sta. 32+20 “PR-S-Fullerton”)
Monroe Medical Park Boulevard	From approx. Sta.10+26 “PR-S-Hospital” to Fullerton Pike
Judd Avenue	From Fullerton Pike to Jordan Court
Tapp Road	From 300 feet east of Rex Grossman Boulevard (approx. Sta. 60+25 “PR-S-Tapp”) to South Danlyn Road (approx. Sta. 41+90 “PR-S-Tapp”)
Distributor Road (NB & SB)	From Tapp Road to SR 45/2nd Street
Danlyn Road	From Tapp Road to 150 feet north of Tapp Road (approx. Sta. 6+35 “PR-S-Danlyn”)
South Yonkers Street	From Tapp Road to 300 feet south
Rex Grossman Blvd.	From Cota Drive to West Schmaltz Blvd.
Maple Leaf Drive	From 150 feet west to end of road
Oak Leaf Drive	From 150 feet west of Project ROW to the Project ROW
Whitehall Crossing Boulevard	From 200 feet west to intersection of existing SR 37
Vernal Pike	From 17th Street (approx. Sta. 91+30 “PR-S-Vernal Pike”) to Woodyard Road (approx. Sta. 61+60 “PR-S-Vernal Pike”)
Industrial Park Road	From approx. Sta. 12+50 “PR-S-Industrial” to Vernal Pike (approx. Sta. 26+33 “PR-S-Industrial”)
North Packinghouse Road	From Vernal Pike to 900 feet north (approx. Sta. 18+50 “PR-S-Packinghouse”)
Crescent Drive	From West Marquis Drive to 17th Street/Vernal Pike
17th Street	From Crescent Drive to North Lindenbergh Drive
Acuff Road	From 150 feet west of existing SR 37 to Prow Road
Kinser Pike	From Old Kinser Pike (approx. Sta. 88+78 “PR-S-Kinser Pike” to Griffy Creek Bridge (approx. Sta. 42+65 “PR-S-Kinser Pike”)
Griffith Cemetery Access Road	From approx. Sta. 726+50 “SR37”) to Sample Road
Wayport Access Road	From approx. Sta. 10+00 “PR-S-Wayport SE” to Sample Road

Description	Approximate Limits
Connaught Road	From 100 feet east of existing SR 37 to 100 feet west of existing SR 37
Ellis Road	From Wayport Access Road to 100 feet east
Griffith Cemetery Road	From 100 feet west of existing SR 37 to existing SR 37
Showers Road	From 600 feet south of Wylie Road to Wylie Road
Wylie Road	200 feet east and west of existing SR 37
Stonebelt Drive	From 100 feet west of existing SR 37 to existing SR 37
Purcell Drive	From existing SR 37 to 100 feet east and west of existing SR 37
Wayport Road (South)	100 feet west and east of existing SR 37
Wayport Road (North)	100 feet west and east of existing SR 37
Sample Road	1,100 feet west of existing SR 37 (approx. Sta. 101+25 “PR-S-Sample” to 700 feet southeast of Wayport Road (approx. Sta. 130+00 “PR-S-Sample”)
Wayport Access Road – North of Sample Road Interchange	From Sample Road to Chambers Pike
Duxbury Drive	From existing SR 37 to 150 feet east of existing SR 37
Simpson Chapel Road	From 200 feet west of existing SR 37 to existing SR 37
Lee Paul Road	From Simpson Chapel Road to 200 feet north of existing SR 37
Access Road Southbound	From Simpson Chapel Road to Burma Road
Fox Hollow Road	From Existing SR 37 to 100 feet east of existing SR 37
North Crossover Road	From 200 feet west of existing SR 37 to existing SR 37
Chambers Pike	From 700 feet west of existing SR 37 (approx. Sta. 10+40 “PR-S-Chambers”) to 400 feet south of Wayport Access Road (approx. Sta. 25+40 “PR-S-Chambers”)
Sylvan Lane	From 200 west of existing SR 37 to of existing SR 37
Sparks Lane	From existing SR 37 to Chambers Pike
Burma Road	From existing NB SR 37 to 150 feet west of existing SR 37
Bryants Creek Road	From existing SR 37 to 150 feet east of existing SR 37
Petro Road	Entire length of road
Cooksey Lane	From Turkey Track Road to Petro Road

Description	Approximate Limits
Paragon Road	From Turkey Track Road to existing SR 37
Pine Boulevard	From existing SR 37 to 150 feet east of existing SR 37
Old SR 37 #1 Access Road	From southern intersection of existing SR 37 (approx. Sta. 11+35 “PR-S-Old SR 37-1”) to northern intersection of existing SR 37 (approx. Sta. 39+78 “PR-S-Old SR 37-1”)
Turkey Track Road	From 100 feet west of existing SR 37 (approx. Sta. 51+00 “PR-S-Turkey Track”) to existing SR 37 (approx. Sta. 59+96 “PR-S-Turkey Track”)
Liberty Church South Access Road	From intersection of Old SR 37 and SR 37 to 1,000 feet west of the intersection of Liberty Church Road and SR 37
Old SR 37 #2 Access Road	From 500 feet south of Liberty Church Road (approx. Sta. 53+00 “PR-S-Old SR37-2”) to Liberty Church Road (approx. Sta. 68+18 “PR-S-Old SR37-2”)
Godsey Road	From existing SR 37 to existing SR 37
Liberty Church Road	From existing SR 37 to 1,800 feet east of existing SR 37
Liberty Church North Access Road	From 1,000 feet west of the intersection of SR 37 and Liberty Church Road to Legendary Road
Old SR 37 #3 Access Road	From Liberty Church Road (approx. Sta. 10+00 “PR-S-Old SR37-3”) to 7200 feet north of Liberty Church Road (approx. Sta. 72+00 “PR-S-Old SR37-3”
Legendary Drive	From 150 feet west of existing SR 37 to SR 37
Local Service Road One	From Chambers Pike to East Sparks Lane
Local Service Road Two	From Existing SR 37 to Old SR 37
Local Service Road Three	From Unnamed Road to Old SR 37

9.3.2 General Design Requirements

For the purposes of this Section 9.3.2, a “Restrictive Condition” means a condition that would require Additional Properties or a condition that would cause an impact to any forest, wetland, stream, “Do Not Disturb” zone identified in Section 7 (Environmental), or other environmentally sensitive area that is not the subject of any existing IFA-Provided Approvals, other existing Governmental Approvals, or of pending applications for IFA-Provided Approvals and would consequently require Developer to seek a permit modification.

Developer shall comply with the following requirements:

1. Clear Zones – Clear zones shall be provided per Project Standards.

2. Side Slopes: Developer shall design slopes to avoid the need for traffic barrier whenever possible. Where a Restrictive Condition does not permit a 6:1 or flatter slope, Developer may use other criteria shown below. In accordance with PPA Section 1.4.3, Developer is not entitled to rely on the side slopes or traffic barrier treatments shown in the Reference Design as accurately describing a design or engineering solution or that such side slopes or traffic barrier treatments comply with the PPA Documents, Governmental Approvals, or Laws. Developer shall design the slopes in the order of precedence shown below, with criterion 1 being the requirement, followed by criterion 2 as the next desirable and other criteria in decreasing levels of desirability. The side slope selection criteria shall be as follows:

    1. Use 6:1 (H:V) or flatter slopes.

    2. Use steeper slopes of 6:1 to 4:1.

    3. Use a combination of recoverable slopes (between 6:1 and 4:1 within the clear zone) and non-recoverable slopes (between 4:1 and 3:1 outside the clear zone) creating a “barn roof” section.

    4. Use non-recoverable slopes (3:1 or steeper) shielded by traffic barrier.

    5. Use retaining walls or reinforced soil slopes where side slopes steeper than 3:1 are required.

    Developer shall obtain INDOT approval for variations to the side slope design criteria order listed above.

    Outside clear zones, the following side slope criteria apply to all slopes except rock cuts. Developer shall use 3:1 side slopes or flatter at all locations unless a Restrictive Condition applies, in which case Developer shall obtain written approval from IFA to utilize steeper than 3:1 slopes in all such locations. The maximum allowable slope is 2:1, but Developer shall attempt to use 2.5:1 slopes prior to using 2:1 slopes. If 2:1 slopes are used, Developer shall prepare a Department Level Two design exception to document these locations. Slopes steeper than 3:1 shall be evaluated for stability. Developer shall seed and protect all disturbed slopes that are 3:1 or steeper with biodegradable heavy-duty erosion control blankets in accordance with the Project Standards.

    For rock cuts, Developer shall comply with the requirements of Section 13.3.2.7 (Design of Permanent Cut Slopes).

3. I-69 Overpasses – The following criteria apply to roads over I-69:

    a. Where the design speed is less than 45 MPH, stopping sight distance for crest vertical curves over I-69 shall meet or exceed the requirements for 45 MPH.

    b. The maximum grade shall not exceed 5 percent over I-69, except at Vernal Pike. Vernal Pike shall not exceed 7 percent over I-69.

        Steeper than 5 percent grades are allowed to match existing grades at the tie-in locations.

4. Roadside Ditches – Ditches, except for Mainline medians, shall have a minimum of a 4-foot bottom width.

5. Rock Cut Sections – Developer shall determine the limits of the rock cut sections based on Developer's final geotechnical reports. Ditches in rock-cut sections shall be designed to ensure that adequate capacity is provided and that the side slopes will stay within Project ROW limits.

6. Barrier/Guardrail Offset –The offset shall be 2 feet from the paved shoulder to the face of guardrail or barrier for shoulders less than 12 feet wide.

7. Graded Shoulder Behind Guardrail – For locations where guardrail is required, 2 feet of embankment shall extend beyond the back of the guardrail post to the hinge point of the front slope. If the 2:1 side slopes cannot be met inside the Project ROW, Developer may request written permission from IFA to reduce the embankment behind the guardrail to less than 2 feet in areas where doing so shall avoid additional Project ROW impacts.

8. Cable Barrier System – Provide a cable barrier system (CBS) median section beginning just north of the SR 46 interchange to the north Project Limits. CBS is not required in the bifurcated section. The bifurcated section is defined as the portion of mainline from approximately 800 feet north of Sylvan Lane to the Bryant Creek crossing, approximately 1400 feet south of the Monroe County line.

9. Changes to Design Requirements – Developer shall not design the roadways to meet less than the minimum requirements of the Specific Design Requirements for each roadway unless written approval is received from IFA.

10. Guardrail Calculations – Developer shall determine the final guardrail length-of-need and complete all guardrail calculations in accordance with project standards. Guardrail length-of-need shall be computed by utilizing the requirements in the Roadside Design Guide 2011 Edition.

11. U-turn Median Openings – Developer shall provide U-turn median openings along the mainline in the rural area at minimum every mile and at least 1500 feet from any interchange or overpass. Developer shall coordinate locations of U-turn median openings with INDOT.

12. Cul-de-sacs – All cul-de-sacs shall consist of a minimum 45-foot radius with a 2-foot shoulder.

13. Borrow and Disposal -- Developer shall obtain approval from IFA for borrow and disposal sites, before material is excavated or disposed of within or outside of the Project ROW. Borrow and disposal sites within the Project ROW shall be in compliance with the Aesthetics and Enhancement Implementation Plan, and shall not impact forests, wetlands, streams or other environmental features.

14. Driveways – Developer shall provide and perpetuate existing driveways to properties within the project limits at all locations outside of limited access Project ROW in accordance with Project Standards. Developer shall notify affected property owners 60 days prior to construction and have construction plans available for viewing at the Bloomington Project Office. Developer shall be responsible for obtaining temporary right of way for driveway construction on private property. The Developer shall provide IFA documentation of allowing Developer access to private property for construction at least 7 days prior to construction on private property.

15. Glare Screens – Glare screens shall be provided where necessary. Glare Screen requirements shall be developed by utilizing the requirements in the NCHRP *Synthesis of Highway Practice 66, Glare Screen Guidelines*.

16. Unused Pavement – Developer shall remove all unused and/or abandoned pavements and appurtenances within the Project Limits.

9.3.3 Specific Design Requirements

The following Specific Design Requirements are the minimum design requirements for the Project and were developed for purposes of setting design requirements for the Project and not to be a basis or expectation of future use of the Project. The Specific Design Requirements apply only to the design of the roadways and as otherwise set forth in these Technical Provisions. IFA does not warrant the accuracy or completeness of the information in the Specific Design Requirements, including any information, data, extrapolations, or interpretations of current or future traffic or composition of traffic, and specifically disclaims the Specific Design Requirements for any purpose other than the design of the roadways or such other purposes expressly set forth in the Technical Provisions. IFA shall not be responsible or liable in any respect for any causes of action, claims, or Losses whatsoever suffered by any Developer-Related Entity by reason of any use of information contained in, any conclusions Developer may draw from, or any action or forbearance in reliance on the Special Design Requirements except with regard to the design of the roadway. Developer's use of the Specific Design Requirements for any purpose other than roadway design shall be at the Developer's sole risk. Developer is not entitled to rely on the Specific Design Requirements for purposes of complying with the requirements of the O&M Work. Developer is solely responsible for meeting the performance requirements of the O&M Work notwithstanding that actual events, data, or performance differ from the information contained in the Specific Design Requirements.

Table 9–2: I-69 (Urban) Design Data

From South Project Limits to Sample Road Interchange

Jurisdictional System	INDOT
Project Design Criteria	IDM Fig. 53-1 / AASHTO Policy on Design Standards Interstate Systems - 2005
Design Functional Classification	Interstate
Rural/Urban	Urban
Access Control	Full Access Control
Terrain	Rolling
Median Type	CMB
Traffic Data	

Current Year A.A.D.T. (2010)	Southern Termini to Fullerton Pike Interchange – 13,186 NB / 13,908 SB Fullerton Pike Interchange to Tapp Road Interchange – 13,375 NB / 13,922 SB Tapp Road Interchange to 2nd Street Interchange – 15,885 NB / 17,490 SB 2nd Street Interchange to 3rd Street Interchange – 20,364 NB / 20,610 SB 3rd Street Interchange to SR 46 Interchange – 22,008 NB / 23,429 SB SR 46 Interchange to Walnut Street Interchange – 9,308 NB / 10,271 SB Walnut Street Interchange to Sample Road Interchange – 12,666 NB / 13,575 SB
Opening Year A.A.D.T. (2016)	Southern Termini to Fullerton Pike Interchange – 24,718 NB / 22,822 SB Fullerton Pike Interchange to Tapp Road – 28,588 NB / 26,548 SB Interchange –Tapp Road Interchange to 2nd Street Interchange – 23,136 NB / 22,141 SB 2nd Street Interchange to 3rd Street Interchange – 31,067 NB / 29,189 SB 3rd Street Interchange to SR 46 Interchange –30,488 NB / 29,277 SB SR 46 Interchange to Walnut Street Interchange – 23,049 NB / 23,855 SB Walnut Street Interchange to Sample Road Interchange – 24,621 NB / 25,388 SB
Design Year A.A.D.T. (2035)	Southern Termini to Fullerton Pike Interchange – 32,419 NB / 30,099 SB Fullerton Pike Interchange to Tapp Road Interchange – 36,680 NB / 35,485 SB Tapp Road Interchange to 2nd Street Interchange – 30,804 NB / 30,230 SB 2nd Street Interchange to 3rd Street Interchange – 39,603 NB / 37,652 SB 3rd Street Interchange to SR 46 Interchange – 39,586 NB / 36,962 SB SR 46 Interchange to Walnut Street Interchange – 28,350 NB / 29,184 SB Walnut Street Interchange to Sample Road Interchange – 32,055 NB / 33,047 SB

2035 Design Hourly Volume (D.H.V.)	Southern Termini to Fullerton Pike Interchange – 2,666 NB / 2,684 SB Fullerton Pike Interchange to Tapp Road Interchange – 2,962 NB / 3,134 SB Tapp Road Interchange to 2nd Street Interchange – 2,508 NB / 2,594 SB 2nd Street Interchange to 3rd Street Interchange – 3,108 NB / 3,220 SB 3rd Street Interchange to SR 46 Interchange – 3,167 NB / 3,105 SB SR 46 Interchange to Walnut Street Interchange – 2,344 NB / 2,474 SB Walnut Street Interchange to Sample Road Interchange – 2,801 NB / 2,937 SB
2035 Percent Trucks (A.A.D.T.)	Southern Termini to Fullerton Pike Interchange – 19 NB / 19 SB Fullerton Pike Interchange to Tapp Road Interchange – 17 NB / 17 SB Tapp Road Interchange to 2nd Street Interchange – 19 NB / 19 SB 2nd Street Interchange to 3rd Street Interchange – 16 NB / 16 SB 3rd Street Interchange to SR 46 Interchange – 16 NB / 17 SB SR 46 Interchange to Walnut Street Interchange – 22 NB / 22 SB Walnut Street Interchange to Sample Road Interchange – 20 NB / 20 SB
2035 Percent Trucks (D.H.V.)	Southern Termini to Fullerton Pike Interchange – 11 NB / 4 SB Fullerton Pike Interchange to Tapp Road Interchange – 10 NB / 3 SB Tapp Road Interchange to 2nd Street Interchange – 11 NB / 3 SB 2nd Street Interchange to 3rd Street Interchange – 10 NB / 3 SB 3rd Street Interchange to SR 46 Interchange – 4 NB / 4 SB SR 46 Interchange to Walnut Street Interchange – 14 NB / 6 SB Walnut Street Interchange to Sample Road Interchange – 5 NB / 5 SB
Proposed Design Speed	70
Proposed Posted Speed	55
Special Features	
The Level 1 design exception for inside shoulder width is only valid for overlay of existing pavement. If pavement is reconstructed, the shoulder width shall be per IDM.	

Provide four travel lanes in each direction from the south end of the Project to the Fullerton Pike Interchange. The outside NB lane shall become the exit ramp to Fullerton Pike. The SB entrance ramp from Fullerton Pike shall become the outside SB lane to the south end of the Project.
Provide a continuous auxiliary lane from the SB entrance ramp from Tapp Road interchange to the SB exit ramp to Fullerton Pike.

Table 9–3: I-69 (Rural) Design Data

From Sample Road Interchange to North Project Limits

Jurisdictional System	INDOT
Project Design Criteria	IDM Fig. 53-1 AASHTO Policy on Design Standards Interstate Systems - 2005
Design Functional Classification	Interstate
Rural/Urban	Rural
Access Control	Full Access Control
Terrain	Rolling
Median Type	Depressed
Traffic Data	
Current Year A.A.D.T. (2010)	Sample Road Interchange to Liberty Church Interchange – 12,159 NB / 11,329 SB Liberty Church Road to Northern Termini – 11,571 NB / 11,371 SB
Opening Year A.A.D.T. (2016)	Sample Road Interchange to Liberty Church Interchange – 22,681 NB / 22,827 SB Liberty Church Road to Northern Termini – Interchange – 23,809 NB / 23,500 SB
Design Year A.A.D.T. (2035)	Sample Road Interchange to Liberty Church Interchange – 29,550 NB / 29,545 SB Liberty Church Road to Northern Termini – 31,079 NB / 30,738 SB
Design Hourly Volume (D.H.V.) (2035)	Sample Road Interchange to Liberty Church Interchange – 2,656 NB / 2,556 SB Liberty Church Road to Northern Termini – 2,790 NB / 2,668 SB
2035 Percent Trucks (A.A.D.T.)	Sample Road Interchange to Liberty Church Interchange – 22 NB / 22 SB Liberty Church Road to Northern Termini – 21 NB / 21 SB
2035 Percent Trucks (D.H.V.)	Sample Road Interchange to Liberty Church Interchange – 5 NB / 5 SB Liberty Church Road to Northern Termini – 5 NB / 5 SB
Proposed Design Speed	70
Proposed Posted Speed	70
Special Features	
Provide a three-lane section, including a truck climbing lane, where critical length of grade is exceeded.	

Table 9-4: Interchange at I-69 and Fullerton Pike Design Data

Roadway Type	RAMPS			
	NB I-69 to Fullerton Pike	Fullerton Pike to NB I-69	SB I-69 to Fullerton Pike	Fullerton Pike to SB I-69
Jurisdictional System	INDOT			
Project Design Criteria	IDM Chapter 48			
Design Functional Classification	Principal Arterial			
Rural/Urban	Urban (Suburban)			
Ramp Type	Exit	Entrance	Exit	Entrance
Terrain	Rolling			
Median Type	N/A			
Traffic Data				
Current Year AADT	NA	NA	NA	NA
Opening Year AADT (2016)	1093	4963	4568	842
Design Year AADT	1877	6138	6510	1124
Design Hourly Volume (DHV) 2035	150	591	561	111
2035 Percent Trucks AADT	7	4	3	10
2035 Percent Trucks DHV	6	2	1	8
Special Features:				
None specified				

Table 9-5: Interchange at I-69 and Tapp Road Design Data

Roadway Type	RAMPS			
	NB I-69 to Tapp Road	Tapp Road to SB I-69		
Jurisdictional System	INDOT			
Project Design Criteria	IDM Chapter 48			
Design Functional Classification	Principal Arterial			
Rural/Urban	Urban (Suburban)			
Ramp Type	Exit	Entrance		
Terrain	Rolling			
Median Type	N/A			
Traffic Data				
Current Year AADT	2306	3597		
Opening Year AADT (2016)	5453	4407		
Design Year AADT	5876	5255		
Design Hourly Volume (DHV) 2035	497	540		
2035 Percent Trucks AADT	4	4		
2035 Percent Truck DHV	4	3		
Special Features:				
None specified				

Table 9-6: Interchange at I-69 and SR 45/ 2nd Street (Bloomfield Road) Design Data

Roadway Type	RAMPS

	SB I-69 to SR 45	SR 45 to NB I-69		
Jurisdictional System	INDOT			
Project Design Criteria	IDM Chapter 48			
Design Functional Classification	Principal Arterial			
Rural/Urban	Urban (Suburban)			
Ramp Type	Exit	Entrance		
Terrain	Rolling			
Median Type	N/A			
Traffic Data				
Current Year AADT	6718	6786		
Opening Year AADT (2016)	7048	7932		
Design Year AADT	7422	8799		
Design Hourly Volume (DHV) 2035	626	850		
2035 Percent Trucks AADT	5	5		
2035 Percent Trucks DHV	3	3		
Special Features:				
None specified				

Table 9-7: Interchange at I-69 and SR 48/ 3rd Street (Whitehall Road) Design Data

Roadway Type	RAMPS			
	SB I-69 to SR 48	SR 48 to NB I-69		
Jurisdictional System	INDOT			

Roadway Type	RAMPS			
	SB I-69 to SR 48	SR 48 to NB I-69		
Project Design Criteria	IDM Chapter 48			
Design Functional Classification	Principal Arterial			
Rural/Urban	Urban (Suburban)			
Ramp Type	Exit	Entrance		
Terrain	Rolling			
Median Type	N/A			
Traffic Data				
Current Year AADT	6,550	6,690		
Opening Year AADT (2016)	7,892	8,101		
Design Year AADT	8,829	9,024		
Design Hourly Volume (DHV) 2035	865	880		
2035Percent Trucks AADT	7	4		
2035 Percent Trucks DHV	5	3		
Special Features:				
None specified				

Table 9-8: Interchange at I-69 and Walnut Street Design Data

Roadway Type	RAMPS			
	SB I-69 to Walnut Street	Walnut Street to NB I-69		
Jurisdictional System	INDOT			
Project Design Criteria	IDM Chapter 48			

Roadway Type	RAMPS			
	SB I-69 to Walnut Street	Walnut Street to NB I-69		
Design Functional Classification	Interchange Ramp–Principal Arterial beyond interchange			
Rural/Urban	Rural			
Ramp Type	Exit	Entrance		
Terrain	Rolling			
Median Type	N/A			
Traffic Data				
Current Year AADT	4,565	4146		
Opening Year AADT (2016)	1,533	1,572		
Design Year AADT	3,863	3,705		
Design Hourly Volume (DHV) 2035	463	534		
2035 Percent Trucks AADT	1	1		
2035 Percent Trucks DHV	1	0		
Special Features:				
A taper exit design shall be allowed for the southbound exit ramp to match existing conditions.				
Southbound exit ramp design speed is 45 mph for first curve and 35 mph for second curve.				

Table 9-9: Interchange at I-69 and Sample Road Design Data

Roadway Type	RAMPS			
	NB I-69 to Sample Road	Sample Road to NB I-69	SB I-69 to Sample Road	Sample Road to SB I-69
Jurisdictional System	INDOT			
Project Design Criteria	IDM Chapter 48			

Roadway Type	RAMPS			
	NB I-69 to Sample Road	Sample Road to NB I-69	SB I-69 to Sample Road	Sample Road to SB I-69
Design Functional Classification	Collector, Local-Agency			
Rural/Urban	Rural			
Ramp Type	Exit Ramp	Entrance Ramp	Exit Ramp	Entrance Loop
Terrain	Rolling			
Median Type	N/A			
Traffic Data				
Current Year AADT	NA	NA	NA	NA
Opening Year AADT (2016)	3,375	1,435	1,219	3,780
Design Year AADT	4,227	1,722	1,369	4,871
Design Hourly Volume (DHV) 2035	339	194	124	505
2035 Percent Trucks AADT	2	6	6	3
2035 Percent Trucks DHV	1	2	3	1
Special Features:				
None specified				

Table 9-10: Interchange at I-69 and Liberty Church Road Design Data

Roadway Type	RAMPS			
	NB I-69 to Liberty Church Road	Liberty Church Road to NB I-69	SB I-69 to Liberty Church Road	Liberty Church Road to SB I-69
Jurisdictional System	INDOT			
Project Design Criteria	IDM Chapter 48			
Design Functional	Collector, Local-Agency			

Roadway Type	RAMPS			
	NB I-69 to Liberty Church Road	Liberty Church Road to NB I-69	SB I-69 to Liberty Church Road	Liberty Church Road to SB I-69
Classification				
Rural/Urban	Rural			
Ramp Type	Exit Ramp	Entrance Ramp	Exit Ramp	Entrance Ramp
Terrain	Rolling			
Median Type	N/A			
Traffic Data				
Current Year AADT	NA	NA	NA	NA
Opening Year AADT (2016)	790	1,919	1,642	921
Design Year AADT	992	2,521	2,146	953
Design Hourly Volume (DHV) 2035	100	234	203	91
2035 Percent Trucks AADT	2	2	2	2
2035 Percent Trucks DHV	1	1	1	1
Special Features:				
None specified				

Table 9–11: That Road Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig 55-3G
Design Functional Classification	Collector
Rural/Urban	Urban (Suburban)
Access Control	None
Terrain	Rolling

Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	3,947
Opening Year A.A.D.T. (2016)	682
Design Year A.A.D.T. (2035)	973
Design Hourly Volume (D.H.V.) (2035)	94
Directional Distribution (EB/WB)	81
Percent Trucks (A.A.D.T.)	3
Percent Trucks (D.H.V.)	2
Proposed Design Speed	40
Proposed Posted Speed	35
Special Features	
Provide 5-foot paved shoulder on each side for bicycle facilities.	

Table 9–12: Rockport Road Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig 55-3G
Design Functional Classification	Collector
Rural/Urban	Urban (Suburban)
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	889
Opening Year A.A.D.T. (2016)	3,433
Design Year A.A.D.T. (2035)	5,282
Design Hourly Volume (D.H.V.) (2035)	489
Directional Distribution	62
Percent Trucks (A.A.D.T.)	3
Percent Trucks (D.H.V.)	2
Proposed Design Speed	40
Proposed Posted Speed	35
Special Features	
Provide 5-foot paved shoulder on each side for bicycle facilities.	

Table 9–13: Fullerton Pike

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig. 55-3E
Design Functional Classification	Principal Arterial
Rural/Urban	Urban (Suburban)
Access Control	Partial
Terrain	Rolling
Median Type	N/A

Traffic Data	
Current Year A.A.D.T. (2010)	East of SR 37 - 1200, West of SR 37 - 5563
Opening Year A.A.D.T. (2016)	East of I-69 - 8,565, West of I-69 - 7,305
Design Year A.A.D.T. (2035)	East of I-69 - 14,027, West of I-69 -10,880
Design Hourly Volume (D.H.V.) (2035)	East of I-69 - 1,299, West of I-69 -850
Directional Distribution	East of I-69 - 51, West of I-69 - 60
Percent Trucks (A.A.D.T.)	East of I-69 - 4, West of I-69 - 2
Percent Trucks (D.H.V.)	East of I-69 - 3, West of I-69 - 1
Proposed Design Speed	45
Proposed Posted Speed	35
Special Features	
Provide a 5-foot sidewalk on the south side and a 10-foot multi-use path on the north side. The sidewalk shall be offset from the curb line a minimum of 5 feet.	

Table 9–14: Tapp Road Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig. 55-3E
Design Functional Classification	Principal Arterial
Rural/Urban	Urban (Suburban)
Access Control	Partial
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	East of SR 37 - 11,246, West of SR 37 - 15,848
Opening Year A.A.D.T. (2016)	East of I-69 - 12,992, West of I-69 - 12,830
Design Year A.A.D.T. (2035)	East of I-69 - 14,849, West of I-69 -13,624
Design Hourly Volume (D.H.V.) (2035)	East of I-69 - 1,293, West of I-69 - 1,213
Directional Distribution	East of I-69 - 51, West of I-69 - 56
Percent Trucks (A.A.D.T.)	East of I-69 - 3, West of I-69 - 2
Percent Trucks (D.H.V.)	East of I-69 - 2, West of I-69 - 2
Proposed Design Speed	40
Proposed Posted Speed	30
Special Features	
Provide a 5-foot sidewalk on the south side and a 10-foot multi-use path on the north side. The sidewalk shall be offset from the curb line a minimum of 5 feet.	
Coordinate with IU Health Bloomington facility (owned by Bloomington Hospital, Inc.) all excavation activities along Tapp Road east of Rex Grossman Boulevard to identify extent and duration of excavation and enable hospital to meet radiation shielding requirements.	

Table 9–15: NB Distributor Road between Tapp Road and SR 45 Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3B
Design Functional Classification	Collector
Rural/Urban	Urban

Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	n/a
Opening Year A.A.D.T. (2016)	3,548
Design Year A.A.D.T. (2035)	4,565
Design Hourly Volume (D.H.V.) (2035)	404
Directional Distribution	100
Percent Trucks (A.A.D.T.)	5
Percent Trucks (D.H.V.)	3
Proposed Design Speed	50
Proposed Posted Speed	50
Special Features	
Provide concrete median barrier between distributor road and I-69 mainline.	

Table 9–16: SB Distributor Road between Tapp Road and SR 45 Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3B
Design Functional Classification	Collector
Rural/Urban	Urban
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	n/a
Opening Year A.A.D.T. (2016)	5,057
Design Year A.A.D.T. (2035)	6,397
Design Hourly Volume (D.H.V.) (2035)	599
Directional Distribution	100
Percent Trucks (A.A.D.T.)	4
Percent Trucks (D.H.V.)	3
Proposed Design Speed	50
Proposed Posted Speed	50
Special Features	
Provide concrete median barrier between distributor road and I-69 mainline.	

Table 9–17: SR 45/ 2nd Street (Bloomfield Road) Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig. 55-3E
Design Functional Classification	Principal Arterial
Rural/Urban	Urban (Suburban)
Access Control	Partial

Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	West of SR 37 – 26,687 East of SR 37 – 18,410
Opening Year A.A.D.T. (2016)	West of I-69 – 24,423 East of I-69 – 23,217
Design Year A.A.D.T. (2035)	West of I-69 – 30,034 East of I-69 – 29,654
Design Hourly Volume (D.H.V.) (2035)	West of I-69 – 2,583 East of I-69 – 2,814
Directional Distribution	West of I-69 – 55 East of I-69 – 53
Percent Trucks (A.A.D.T.)	2
Percent Trucks (D.H.V.)	2
Proposed Design Speed	45
Proposed Posted Speed	40
Special Features	
Provide a 5-foot sidewalk on the south side and a 10-foot multi-use path on the north side. The sidewalk shall be offset from the curb line a minimum of 5 feet.	
All slopes greater than 3:1 shall be protected with handrail.	
Provide a continuous auxiliary lane adjacent to westbound lanes of SR 45 from the Industrial Boulevard existing right turn lane to the SB I-69 exit ramp terminal.	

Table 9–18: SR 48 / 3rd Street (Whitehall Road) Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig. 55-3E
Design Functional Classification	Principal Arterial
Rural/Urban	Urban (Suburban)
Access Control	Partial
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	West of SR 37 to SR 37 – 32,733 SR 37 to east – 17,137
Opening Year A.A.D.T. (2016)	West of I-69 – 34,754 East of I-69 – 22,639
Design Year A.A.D.T. (2035)	West of I-69 – 42,239 East of I-69 – 34,052
Design Hourly Volume (D.H.V.) (2035)	West of I-69 – 3,687 East of I-69 – 2,903
Directional Distribution	West of I-69 - 53 East of Sr 37 - 50
Percent Trucks (A.A.D.T.)	West of I-69 – 4 East of I-69 - 3
Percent Trucks (D.H.V.)	West of I-69 - 3

	East of I-69- 2
Proposed Design Speed	45
Proposed Posted Speed	40
Special Features	
Provide 10 foot multi-use path on the south side. Provide 10 foot multi-use path on the north side.	

Table 9–19: Vernal Pike Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig. 55-3F
Design Functional Classification	Minor Arterial
Rural/Urban	Urban (Suburban)
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	7,477
Opening Year A.A.D.T. (2016)	11,057
Design Year A.A.D.T. (2035)	15,410
Design Hourly Volume (D.H.V.) (2035)	1,650
Directional Distribution	53
Percent Trucks (A.A.D.T.)	1
Percent Trucks (D.H.V.)	1
Proposed Design Speed	40
Proposed Posted Speed	30 east of SR 37 / 40 west of SR 37
Special Features	
Provide a 5-foot sidewalk on the south side and an 8-foot multi-use path on the north side. The sidewalk shall be offset from the curb line a minimum of 5-feet.	
Vernal Pike shall be constructed as an overpass of I-69.	

Table 9–20: Industrial Park Road Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig. 55-3H
Design Functional Classification	Local
Rural/Urban	Urban (Suburban)
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	4,440
Opening Year A.A.D.T. (2016)	4,303
Design Year A.A.D.T. (2035)	6,840
Design Hourly Volume (D.H.V.) (2035)	605
Directional Distribution	51
Percent Trucks (A.A.D.T.)	1

Percent Trucks (D.H.V.)	1
Proposed Design Speed	35
Proposed Posted Speed	25
Special Features	
None Specified	

Table 9–21: North Packinghouse Road Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig. 55-3H
Design Functional Classification	Local
Rural/Urban	Urban (Suburban)
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	< 400
Opening Year A.A.D.T. (2016)	< 400
Design Year A.A.D.T. (2035)	< 400
Design Hourly Volume (D.H.V.) (2035)	< 50
Directional Distribution	50
Percent Trucks (A.A.D.T.)	N/A
Percent Trucks (D.H.V.)	N/A
Proposed Design Speed	35
Proposed Posted Speed	Not Posted
Special Features	
None Specified	

Table 9–22: Kinser Pike Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig. 55-3C
Design Functional Classification	Major Collector, Local-Agency
Rural/Urban	Rural
Access Control	Partial
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	252
Opening Year A.A.D.T. (2016)	1,084
Design Year A.A.D.T. (2035)	1,756
Design Hourly Volume (D.H.V.) (2035)	213
Directional Distribution	66
Percent Trucks (A.A.D.T.)	1
Percent Trucks (D.H.V.)	0
Proposed Design Speed	35 / 30
Proposed Posted Speed	30

Features
Provide 5-foot paved shoulder on each side for bicycle facilities.
Approximately 500 feet north of Bell Road intersection, the proposed design speed shall be 30 MPH instead of 35 MPH.

Table 9–23: Wayport Access Road (South of Sample Road Interchange) Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3B
Design Functional Classification	Collector
Rural/Urban	Urban
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	N/A
Opening Year A.A.D.T. (2016)	186
Design Year A.A.D.T. (2035)	346
Design Hourly Volume (D.H.V.) (2035)	32
Directional Distribution	53
Percent Trucks (A.A.D.T.)	2
Percent Trucks (D.H.V.)	1
Proposed Design Speed	40
Proposed Posted Speed	40
Special Features	
None specified	

Table 9–24: Griffith Cemetery/ Griffith Access Road Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3B
Design Functional Classification	Collector
Rural/Urban	Urban
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	N/A
Opening Year A.A.D.T. (2016)	1,130
Design Year A.A.D.T. (2035)	1,293
Design Hourly Volume (D.H.V.) (2035)	153
Directional Distribution	68
Percent Trucks (A.A.D.T.)	3
Percent Trucks (D.H.V.)	1
Proposed Design Speed	40
Proposed Posted Speed	35
Special Features	
None specified	

Table 9–25: Sample Road Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig. 53-4
Design Functional Classification	Collector, Local-Agency
Rural/Urban	Rural
Access Control	Partial
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	971
Opening Year A.A.D.T. (2016)	East of I-69 - 6,773, West of I-69 - 3,638
Design Year A.A.D.T. (2035)	East of I-69 - 8,533, West of I-69 - 4,730
Design Hourly Volume (D.H.V.) (2035)	East of I-69 - 816, West of I-69 - 462
Directional Distribution	East of I-69 - 56, West of I-69 - 59
Percent Trucks (A.A.D.T.)	East of I-69 - 3, West of I-69 - 2
Percent Trucks (D.H.V.)	East of I-69 - 2, West of I-69 - 1
Proposed Design Speed	50
Proposed Posted Speed	35
Special Features	
Provide 8-foot paved shoulder on each side for bicycle facilities.	

Table 9–26: Wayport Access Road (North of Sample Road Interchange) Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3B
Design Functional Classification	Collector
Rural/Urban	Rural
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	N/A
Opening Year A.A.D.T. (2016)	3,091
Design Year A.A.D.T. (2035)	4,238
Design Hourly Volume (D.H.V.) (2035)	406
Directional Distribution	52
Percent Trucks (A.A.D.T.)	2
Percent Trucks (D.H.V.)	1
Proposed Design Speed	40
Proposed Posted Speed	40
Special Features	
None specified	

Table 9–27: Turkey Track Road Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3B
Design Functional Classification	Collector
Rural/Urban	Rural
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	60
Opening Year A.A.D.T. (2016)	549
Design Year A.A.D.T. (2035)	721
Design Hourly Volume (D.H.V.) (2035)	71
Directional Distribution	52
Percent Trucks (A.A.D.T.)	2
Percent Trucks (D.H.V.)	1
Proposed Design Speed	40
Proposed Posted Speed	40
Special Features	
None specified	

Table 9–28: Chambers Pike Design Data

Jurisdictional System	Monroe County
Project Design Criteria	IDM Fig. 55-3C
Design Functional Classification	Collector, Local-Agency
Rural/Urban	Rural
Access Control	Partial
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	263
Opening Year A.A.D.T. (2016)	168
Design Year A.A.D.T. (2035)	320
Design Hourly Volume (D.H.V.) (2035)	34
Directional Distribution	51
Percent Trucks (A.A.D.T.)	2
Percent Trucks (D.H.V.)	1
Proposed Design Speed	35
Proposed Posted Speed	Not Posted
Special Features	
Provide 8-foot paved shoulder on each side for bicycle facilities.	

Table 9–29: Sparks Lane Design Data

Jurisdictional System	INDOT

Project Design Criteria	55-3B
Design Functional Classification	Collector
Rural/Urban	Rural
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	< 400
Opening Year A.A.D.T. (2016)	< 400
Design Year A.A.D.T. (2035)	< 400
Design Hourly Volume (D.H.V.) (2035)	< 50
Directional Distribution	N/A
Percent Trucks (A.A.D.T.)	N/A
Percent Trucks (D.H.V.)	N/A
Proposed Design Speed	25
Proposed Posted Speed	N.P.
Special Features	
None Specified	

Table 9–30: Old SR 37 #1 Access Road Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3B
Design Functional Classification	Collector
Rural/Urban	Rural
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	79
Opening Year A.A.D.T. (2016)	463
Design Year A.A.D.T. (2035)	561
Design Hourly Volume (D.H.V.) (2035)	55
Directional Distribution	62
Percent Trucks (A.A.D.T.)	1
Percent Trucks (D.H.V.)	0
Proposed Design Speed	40
Proposed Posted Speed	35
Special Features	
None specified	

Table 9–31: Liberty Church South Access Road Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3B
Design Functional Classification	Collector
Rural/Urban	Rural
Access Control	None

Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	N/A
Opening Year A.A.D.T. (2016)	549
Design Year A.A.D.T. (2035)	721
Design Hourly Volume (D.H.V.) (2035)	71
Directional Distribution	52
Percent Trucks (A.A.D.T.)	2
Percent Trucks (D.H.V.)	1
Proposed Design Speed	40
Proposed Posted Speed	35
Special Features	
None specified	

Table 9-32: Liberty Church Road Design Data

Jurisdictional System	Morgan County
Project Design Criteria	IDM Fig. 53-4
Design Functional Classification	Collector, Local-Agency
Rural/Urban	Rural
Access Control	Partial
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	West of SR 37 – 237 East of SR 37 – 1,121
Opening Year A.A.D.T. (2016)	West of I-69 – 1,382 East of I-69 – 2,121
Design Year A.A.D.T. (2035)	West of I-69 – 1,621 East of I-69 – 2,785
Design Hourly Volume (D.H.V.) (2035)	West of I-69 – 320 East of I-69 – 316
Directional Distribution	West of I-69 - 51, East of I-69 - 51
Percent Trucks (A.A.D.T.)	West of I-69 - 2, East of I-69 - 2
Percent Trucks (D.H.V.)	West of I-69 - 1, East of I-69 - 1
Proposed Design Speed	40
Proposed Posted Speed	35
Special Features	
Provide 8-foot paved shoulder on each side for bicycle facilities.	

Table 9–33: Old SR 37 #2 Access Road Design Data

Jurisdictional System	INDOT

Project Design Criteria	55-3B
Design Functional Classification	Collector
Rural/Urban	Rural
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	N/A
Opening Year A.A.D.T. (2016)	1,183
Design Year A.A.D.T. (2035)	1,447
Design Hourly Volume (D.H.V.) (2035)	134
Directional Distribution	51
Percent Trucks (A.A.D.T.)	2
Percent Trucks (D.H.V.)	1
Proposed Design Speed	40
Proposed Posted Speed	40
Special Features	
None specified	

Table 9–34: Liberty Church North Access Road Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3D
Design Functional Classification	Collector
Rural/Urban	Rural
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	N/A
Opening Year A.A.D.T. (2016)	726
Design Year A.A.D.T. (2035)	966
Design Hourly Volume (D.H.V.) (2035)	90
Directional Distribution	51
Percent Trucks (A.A.D.T.)	2
Percent Trucks (D.H.V.)	1
Proposed Design Speed	40
Proposed Posted Speed	40
Special Features	
None specified	

Table 9–35: Old SR 37 #3 Access Road Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3B

Design Functional Classification	Collector
Rural/Urban	Rural
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	N/A
Opening Year A.A.D.T. (2016)	< 400
Design Year A.A.D.T. (2035)	< 400
Design Hourly Volume (D.H.V.) (2035)	< 400
Directional Distribution	N/A
Percent Trucks (A.A.D.T.)	N/A
Percent Trucks (D.H.V.)	N/A
Proposed Design Speed	40
Proposed Posted Speed	40
Special Features	
None specified	

Table 9–36: Local Service Road Design Data

Jurisdictional System	INDOT
Project Design Criteria	55-3D
Design Functional Classification	Collector
Rural/Urban	Rural
Access Control	None
Terrain	Rolling
Median Type	N/A
Traffic Data	
Current Year A.A.D.T. (2010)	< 400
Opening Year A.A.D.T. (2016)	< 400
Design Year A.A.D.T. (2035)	< 400
Design Hourly Volume (D.H.V.) (2035)	< 50
Directional Distribution	N/A
Percent Trucks (A.A.D.T.)	N/A
Percent Trucks (D.H.V.)	N/A
Proposed Design Speed	25
Proposed Posted Speed	20
Special Features	
None Specified	

9.3.3.1 Local and State Roads with Change of Access

The following roadways that have existing access to SR 37, or State or County Roads that shall not have direct access maintained. Roadways are presented in Table 9-38. Some roadways shall to be closed at the Project ROW, some are to be connected to other roadway, and some are planned to be overpasses.

Table 9-38: Local and State Road Access Changes

Roadway /Alignment	Location	Realignment / Closure
That Road	Right	Provide Access Road to Rockport Road.
That Road	Left	Cul-de-sac
Rockport Road	Left and Right	Provide overpass
Barger Lane	Left	Cul-de-sac. (existing access to Tapp Road)
Whitehall Crossing Boulevard	Left	Cul-de-sac
Industrial Park Road at Vernal Pike	Left	Connect to Vernal Pike
North Packing House Road	Left	Connect to Vernal Pike
Hensonburg Road	Left	Cul-de-sac (existing access to Vernal Pike)
Woodyard Road	Left	Terminate at Project ROW (existing access to Vernal Pike)
Acuff Road	Right	Close at the intersection of Prow Road. Provide a curve between Acuff Road and Prow Road, 25 mph minimum design speed
Acuff Road	Left	Provide a hammerhead turnaround (T-Type cul-de-sac) at Project ROW.
Kinser Pike	Left and Right	Close at Project ROW. Provide overpass.
Connaught Road	Right	Connect to access road on the east side of I-69
Ellis Road	Right	Connect to access road located on the east side of I-69
Griffith Cemetery Road	Left	Connect to new access road along the west side of I-69.
Wylie Road	Right and Left	Connect to access roads located on either side of I-69
Showers Road	Right	Connect to access road located on the east side of I-69.
Purcell Drive	Right	Remove
Wayport Road	Right and Left	Close at Project ROW
Duxbury Drive	Right	Close at Project ROW; connect to access road
Simpson Chapel Road	Left	Close at Project ROW; connect to access road.
Lee Paul Road	Left	Close at Project ROW
Fox Hollow Road	Right	Close at Project ROW; connect to access road
Petro Road	Right	Close at Project ROW
Chambers Pike	Left and Right	Close at Project ROW.
Bryants Creek Road	Right	Cul-de-sac
Cooksey Lane	Right	Close at Project ROW
Turkey Track Road	Left	Close at Project ROW
Paragon Road	Left	Cul-de-sac

Pine Blvd.	Right	Cul-de-sac
Old SR 37	Right	Connect to access road

Developer shall remove all private drives and accesses that connect to existing SR-37.

9.3.3.2 Chambers Pike Bypass

Developer shall provide a bypass of the I-69 Chambers Pike overpass for the transport of oversized equipment. The bypass shall accommodate transporting the equipment from I-69 Mainline north of Chambers Pike to a location along the western access road of I-69, approximately 3,000 feet south of the Chambers Pike overpass without passing under Chambers Pike. The transport is anticipated to occur approximately every 15 to 20 years. Developer shall not raise the elevation of Chambers Pike or provide additional clearance under Chambers Pike to provide passage of the oversized equipment.

The bypass shall include all required drainage and other facilities needed and comply with the following requirements:

- Maximum grade: 5 percent
- Minimum width: 24 feet
- Cross slope: 2 percent
- Design speed: 10 mph
- Operations and maintenance requirements described in Section 18.1.1 (General Operations and Maintenance Obligations)

9.4 Design Exceptions

Developer may propose design exceptions and follow the Department's design exception process; however, IFA reserves the right to reject, in its sole discretion, any proposed change that requires a design exception or does not otherwise conform to the requirements of the PPA Documents. All adjustments to the Project shall conform to applicable Laws and Governmental Approvals. Developer is responsible for time delays in obtaining design exceptions. Delays due to approvals for design exceptions shall not be considered Relief Events. All Level Two design exceptions shall be approved by IFA in writing.

Developer shall prepare a Level Two design exception, as defined in the Project Standards, that documents the locations where 2:1 side slopes and steeper are utilized.

IFA has obtained the following design exceptions on the I-69 Section 5 Project.

9.4.1 Level One Design Exceptions

1. Shoulder Widths – From South End of Project Limits to SR 46 – Urban Typical Cross Section. With the addition of a third travel lane, the inside shoulder will be 11'-9" instead of the standard 12'-0" as per IDM.

2. Shoulder Widths – At Indiana Railroad Overpass Structure - Urban Typical Cross Section. The standard 12'-0" outside shoulder per IDM will be reduced to a 10'-0" shoulder underneath the existing Indiana Railroad Overpass structure.

3. Maximum Grade – From Kinser Pike to Griffy Creek – The existing grade in both the northbound and southbound directions is 5 percent. The maximum vertical grade for rolling terrain according to INDOT and AASHTO design criteria is 4 percent. It is proposed to utilize the existing grade in this location to minimize the project construction costs.

4. Maximum Grade – Through the bifurcated section – Southbound Lanes– The existing grade of the existing southbound bifurcated section is 5 percent. The maximum vertical grade for rolling terrain according to INDOT and AASHTO design criteria is 4 percent. It is proposed to utilize the existing grade in this location to minimize the project construction costs.

9.4.2 Level Two Design Exceptions

1. Critical Length of Grade - Between Vernal Pike and SR 46 - SB Lanes – Urban Section
2. Critical Length of Grade - From Kinser Pike to Griffy Creek – SB Lanes – Urban Section
3. Critical Length of Grade - Ellis Road to N. Wayport Rd. - NB Lanes– Urban Section
4. Critical Length of Grade - Through the bifurcated section – SB Lanes – Rural Section
5. Critical Length of Grade – 2,000 feet south of Paragon Road to Paragon Road- NB Lanes – Rural Section
6. Critical Length of Grade – 1,000 feet north of Paragon Road to Old SR 37- SB Lanes – Rural Section
7. Intersection Sight Distance – The intersection of Vernal Pike and Crescent Drive; Sparks Lane and Chambers Pike; and Tapp Road and Danlyn Drive.
8. Roadside Safety Design Element – Barrier Offset - From South End of Project to approx. SR 46
9. Roadside Safety Design Element – Barrier Offset - Through the bifurcated section – Northbound Lanes

9.5 Deliverables

9.5.1 Design Calculations

Design calculations for all proposed and temporary alignments shall include the following:

- Level one checklists with associated calculations
  - Horizontal sight distance (mainline, ramps, and secondary roads)
  - Vertical sight distance
  - Superelevation calculations
- Intersection sight distance
- Intersection geometrics (including vehicle turning movements)
- Clear zone calculations and curve adjustments
- Guardrail length of need including Traffic barrier, end treatments, and impact attenuators
- Earthwork calculations

- Pavement quantities

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10 PAVEMENT

10.1 General

This Section 10 covers the design and construction of pavement. Developer shall provide long-lasting pavement that meets required functionality, durability, and safety requirements. Developer shall conduct all work necessary to meet the requirements associated with this Section 10 and the PPA Documents.

10.2 Administrative Requirements

10.2.1 Certification

All field and laboratory testing for pavements and associated materials conducted by Developer shall be conducted in an accredited laboratory and performed by certified personnel who are qualified to perform Department test methods.

10.2.2 Coordination

IFA's Authorized Representative will assist in the coordination and resolution of roadway pavement issues with affected interests and regulatory agencies. Developer shall document the resolutions of issues, including meeting minutes and memoranda for the record.

10.3 Design Requirements

10.3.1 Developer Specified Pavement Designs

For pavement sections within the O&M Limits Developer shall design, maintain and rehabilitate roadway pavements within the O&M Limits.

For purposes of this Section 10.3, the word "lanes" shall mean all travel lanes, auxiliary lanes, passing lanes, deceleration lanes, and any other pavement on which traffic may normally travel. The word "shoulders" shall mean inside and outside shoulders and gore areas. Ramps shall be considered to start at the theoretical back of gore.

Developer shall design pavement structural layers for all new roadways within the O&M Limits with no reduction of, or restrictions to allowable legal load limits. Materials for roadway pavement surfaces may be hot-mixed asphalt (HMA) or Portland cement concrete (PCC). The pavement design shall provide for positive drainage of subgrade and subbase materials from under the pavement. At Substantial Completion, the Developer shall provide a consistent pavement type throughout each roadway element. Each roadway element shall be defined as a discreet segment, such an entire ramp, a section of roadway between two pavement termini, or other logical limits.

During the operating period, Developer shall prepare designs for all pavement rehabilitation activities and submit them for IFA review and approval.

10.3.2 Pavement Design Reports

Developer shall prepare and submit Preliminary Pavement Design Reports for review and comment by IFA for Design Review with the Stage 1 Design Documents. Final Pavement Design Reports shall be signed and sealed by a Registered Professional Engineer and submitted for review and approval by IFA prior to the Released for Construction submittal.

Pavement Design Reports shall include, at a minimum, the following:

- All design inputs, including design method, design life, analysis parameters, performance criteria, traffic load spectra, climate, pavement structural cross section, subgrade and subbase drainage, materials characteristics and input parameters including soil subgrade.
- Discussion of the input parameters, rationale and assumptions used.
- Site plan showing the limits of the roadway element covered by the design report.
- Typical cross section drawings for the recommended pavement design strategy.

Prior to Handback, Developer shall provide calculations and condition distress surveys that address both pavement functional and structural requirements.

10.3.3 IFA Specified Pavement Designs

Outside the O&M Limits the minimum pavement design requirements are specified below.

- HMA pavement for That Road (west of I-69), Rockport Road, Fullerton Pike, Tapp Road, Sam's Club Drive, Danlyn Road, Vernal Pike and Sample Road shall be:
    - 165 lb/sy QC/QA HMA 2, 64, Surface 9.5 mm
    - 275 lb/sy QC/QA HMA 2, 64, Intermediate 19.0 mm
    - 330 lb/sy QC/QA HMA 2, 64, Base 19.0 mm
    - 3 inches of compacted aggregate, No. 53, base
    - Subgrade IA

  Notes:
    a. Provide pavement underdrains for Fullerton Pike in accordance with IDM.

- HMA pavement for existing northbound lanes of SR 37 north of Sample Road interchange used for local access shall be milled and overlaid as follows:
    - For mainline pavement:
        - Mill Asphalt, 2.0 inches
        - Overlay with:
            - 165 lb/sy QC/QA HMA 2, 64, Surface 9.5 mm
            - 220 lb/sy QC/QA HMA 2, 64, Intermediate 12.5 mm
    - For shoulders:
        - Mill Asphalt, Scarification/Profile
        - Overlay with 165 lb/sy QC/QA HMA 2, 64, Surface 9.5 mm.

- HMA for all roads other than those listed above shall be:
    - 165 lb/sy QC/QA HMA 2, 64, Surface 9.5 mm
    - 385 lb/sy QC/QA HMA 2, 64, Intermediate 19.0 mm

- 5 inches of compacted aggregate, No. 53, base
- Subgrade IA

Notes :

a. For curbed sections use 7 inch curb height.
b. For curbed sections use 6 inches compacted aggregate.

10.3.4 Temporary Pavement

Developer shall design, construct, and maintain all temporary pavements within the Project Limits in compliance with the requirements of the PPA Documents and the following performance requirements. Temporary pavement is defined as pavement that is in use by vehicular traffic for 24 months or less:

- Provide documentation describing the assumptions used to design the temporary pavement. At a minimum, the documentation shall include design life and anticipated traffic loading for each temporary pavement location within the Project Limits.
- Provide a durable, maintainable pavement system that meets the following requirements during its service life:
    - Minimum friction number of 37
    - IRI of less than 120 inches/mile
    - Free of potholes, fatigue areas, duress, and rutting exceeding 0.25 inches
    - Provide adequate cross slope to drain water quickly from pavement surface

Developer shall analyze and prepare separate temporary pavement designs, as applicable, for the following:

- Mainline pavements
- Ramp pavements
- Local road pavements

If the IFA believes, in its sole discretion, that these requirements are not being met, the IFA will direct Developer to conduct pavement testing to measure the pavement properties. Both the testing and corrective actions shall be considered part of Developer's Work.

10.3.5 Shoulder Corrugations

Developer shall provide shoulder corrugations for all permanent pavements, in accordance with the Project Standards.

10.3.6 Underdrains

For pavements within O&M Limits, underdrains shall be installed in accordance with the Project Standards.

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11 TRAFFIC

11.1 General

Developer shall be responsible for the traffic analysis of roadway and intersection operations for both interim and permanent conditions; analysis and design activities required to determine advisory speeds; and the design and construction of signage, lighting, traffic signals, and pavement markings prior to Substantial Completion. Developer shall be responsible for verifying that proposed designs meet or exceed minimum requirements specified in the Project Standards and this Section 11.

Signing shall include:

- Regulatory, warning, and guide signs for the I-69 Mainline
- Regulatory, warning, and guide signs for non-Interstate road changes made as part of the Project
- Guide signs for cross streets approaching freeway interchanges (Fullerton Pike, Tapp Road, 2nd Street/SR 45, 3rd Street/SR 48, SR 46, Walnut Street, Sample Road, and Liberty Church Road)

Interchange lighting shall be provided at all interchanges except Walnut Street. Developer shall be responsible for the design and construction of sign structures and light poles, including foundations, conduit systems, circuitry, power supplies, lighting cabinets, and coordination with the power companies (Hoosier Energy, Duke Energy, and South Central Indiana Rural Electric Membership Corporation (REMC)) to obtain power feed for traffic signals and lighting devices.

Pavement markings and raised reflective pavement markers shall be provided along the mainline freeway, ramps, and cross streets within the Project Limits in accordance with the Project Standards.

Developer shall provide fully functioning traffic signals as required for interchange operation based on traffic analysis and IMUTCD signal warrant analysis to be conducted by the Developer. Each signal installation shall include foundations, traffic signal poles, signal heads, conduit system, circuitry, detection devices, associated signal equipment, intersection lighting, and signing. The Work shall include coordinating Utility connections with the proper Utility Owner and coordinating the signal cable connections with local jurisdictions.

11.2 Standards and References

Design and construct the traffic Work in accordance with the applicable requirements of the PPA Documents, including Project Standards and this Section 11; Governmental Approvals; and applicable Laws.

11.3 Engineer Supervision and Qualifications

The design of the activities described in this Section 11 shall be supervised and submitted by a Registered Professional Engineer certified as a Professional Traffic Operations Engineer with a minimum of 10 years of experience on projects of a similar complexity.

Electrical and lighting design shall be supervised and submitted by a Registered Professional Engineer, with a minimum of 10 years of experience on projects of a similar complexity.

11.4 Advisory Speeds

Prior to Final Acceptance, Developer shall submit to the Department for approval a report that documents all mainline advisory speeds and advisory ramp speeds. The report shall include an investigation of the horizontal geometrics based on the American Association of State Highway and Transportation Officials (AASHTO) roadway design guidelines. The investigation shall define the critical stopping sight distance for each ramp, and acceleration and deceleration distances. These values shall be field-verified to determine if the actual conditions provide the critical distances required. The pavement conditions of each ramp shall also be noted. Photographs for each ramp shall be taken and included in the report. Developer shall evaluate each ramp with an approved electronic accelerometer or ball-bank indicator. All electronic accelerometer measurements shall follow the manufacturer's instructions. The field testing using an electronic accelerometer shall not exceed the posted regulatory mainline speed limit and shall be stopped if g-force measurements exceed 0.40 g-ft/s^2. The recommended average g-force for determining advisory speeds is 0.28 g-ft/s^2 and shall be posted in 5-mile-per-hour increments. The field testing using a ball-bank indicator shall be in accordance with Section 2C.08 of the IMUTCD.

11.5 Signing

11.5.1 Design and Construction Requirements

Developer shall design and install signing within the Project Limits in accordance with the Project Standards. Existing signs and sign supports may be identified for re-use by the Developer in the design signing roll plan if the signs and sign supports meet the Project Standards. Developer is not required to provide sign lighting.

Developer shall relocate or replace existing overhead or cantilever sign structures as required to provide proper sign placement, design, and materials.

Developer shall remove and replace existing signing and add new signing as appropriate for roadways where the Project alters existing access or operation. Developer shall also provide for the replacement or removal of any signage within 1 mile outside the Project Limits that is no longer appropriate or pertinent due to construction of the Project.

Existing signs that do not meet Project Standards shall be removed and replaced with new signs meeting the requirements of Section 11.5. Where an existing sign is replaced, Developer shall replace all existing signs on the same supports. In addition, Developer shall replace existing sign supports that do not meet the overhead sign support structural capacity requirements for the new sign(s) in accordance with Section 14.

In preparing the signing design, Developer shall allow for the eventual design and installation of specific service signs, also known as logo signs, by the Department's logo contractor, in accordance with 105 IAC 9-4-10(b). Logo sign maintenance will be performed by the Department's logo sign contractor. This may require an agreement between the Developer and the Department's logo sign contractor.

Developer shall not disturb the existing City of Bloomington signs located between the southbound SR 37 mainline and the exit ramp to Walnut Street. Developer will not be responsible for maintenance of these signs.

11.5.1.1 Design Signing Roll Plans

Developer shall prepare and provide a design signing roll plan for Department approval prior to preparing signing Plans. The design signing roll plan shall include proposed sign locations and messages for all guide signs, typical regulatory and warning sign applications, proposed locations for relocating existing signs located outside of the Project Limits, and proposed locations for new structures. The design signing roll plan shall display signing for all mainlines, ramps, and interchanges, as well as for the arterial streets, frontage roads, and any other signing affected by the Project. Signing modifications due to the Project shall be shown on the design signing roll plan. The plan shall also denote which agency is responsible for ownership and maintenance of each sign and structure (e.g., the Department or a local jurisdiction). The plan features shall include but are not limited to the existing and proposed roadway alignments, Project ROW, Utilities, baseline of construction (including stationing), and existing topography at the tie-in points of the roadway limits of Work. The proposed pavement markings shall also be shown on the design signing roll plan.

Developer shall develop a regional signing plan for Department approval that identifies signing changes required on roads outside of the Project Limits due to construction of the Project. The regional signing plan shall be submitted along with the design signing roll plan.

11.5.1.2 Signing Plan Requirements

Developer shall prepare signing Plans at a scale equal to the roadway Plans. Signing Plans shall show the message, IMUTCD sign designation (if applicable), dimensions, color, border, material, and location of all proposed regulatory signs, warning signs and guide signs, including sign assemblies. Signing Plans shall also show the location, messages, and dimensions of all existing signs. All existing signs to be removed or relocated shall be identified. Signing Plans shall include the location and type of pavement marking, delineators and pavement edge delineation.

Developer shall also include milepost signs in accordance with the IMUTCD along Mainline using the D10-1a, D10-2a, and D10-3a signs. For every whole mile, Developer shall use the D10-5 sign. Reference Markers shall match those currently on the system. I-69 Station 1553+25 corresponds to Mile Post 116.4425.

All exits shall be numbered using reference location sign exit numbering, which means the existing numbers relate to the mile reference of the mile marker, at that location. When more than one exit occurs within the same mile, the first exit shall be identified with the number and letter “A,” the second exit “B,” and so forth. All proposed guide signs shall be detailed on a detail sheet. All ground-mounted sign supports (steel and wood) shall be detailed on this sheet. The tables on this sheet shall identify the sign number, plan sheet number where the sign is located, the sign size, the post size to be used, whether the supports are breakaway or non-breakaway, the support lengths, the lateral clearance code, and the support spacing from the left edge of the sign. Overhead sign structure details shall also be included in the Plan set.

Developer shall provide directional signage from I-69 to the Morgan-Monroe State Forest via the Liberty Church Road and Sample Road Interchanges.

11.5.1.3 Design of Sign Locations

Developer shall design, fabricate, and install all the overhead and ground-mounted signs as shown on the signing Plans. All signs shall be located in accordance with Section 2 of the IMUTCD. Developer shall provide to the Department for review and comment with signing Plan submissions, documentation that there is sufficient sight distance provided to allow for appropriate perception-response time for all signs along the ramps and cross streets. The interchange signing shall include, at a minimum, the 1 mile, ½ mile, and exit direction guide signs, and the exit gore sign. Developer shall provide cross street name signs at overpasses along the mainline freeway. Developer shall design all details of the sign panels, as well as ground-mounted and overhead supports. Developer's sign design shall consider all proposed landscaping, Utility, hydraulic, lighting, and all other roadside features to ensure proper clearances, lighting levels, and adequate sight distance.

11.5.1.4 Sign Material and Design and Construction Requirements

The messages, fonts, font sizes, arrows, shields, colors, borders, and type of supports for the overhead and ground-mounted signs shall be designed and constructed according to the IMUTCD and following interstate interchange classifications. The Clearview font shall be used for all positive contrast guide signs. Positive contrast guide signs are signs that use white text/copy on a dark-colored background (e.g., green, blue, black, brown, etc.).

For purposes of sign design, all interchanges shall be classified as Major, as defined in IMUTCD Section 2E.32: All signs along the mainline freeway and associated ramps shall be "freeway" size. All signs designed and installed along all other roadways shall be "standard" size as identified in the IMUTCD, FHWA Standard Highway Signs Book and the INDOT Standard Highway Signs Book.

11.5.1.5 Sign Supports

For each sign support location, Developer shall draw the sign panel(s) and the sign supports on the corresponding completed cross section. The proper vertical and horizontal clearances, sign sizes and offsets, number of lanes, and lane widths shall be labeled on the cross sections. Developer shall check cross sections and profiles at all sign locations and make adjustments as necessary to provide adequate sight distances and proper placement of the guide signs. If a non-standard overhead sign support is proposed, Developer shall submit calculations to properly size the sign supports for the Department approval with signing Plan submissions.

Signs or sign structures may not be mounted on the bridge overpass structures.

No signs shall be banded to Utility poles, street lighting poles, or overhead or cantilever sign structure uprights.

The mainline freeway and State marked route signing shall be installed at the end of the Project and prior to opening the road to traffic.

Traffic barriers shall be provided for protecting all non-breakaway supports within the clear zone for sign structures within the Project Limits and for new sign structures outside the Project Limits. Non-breakaway signs shall be placed outside the clear zone wherever possible.

See Sections 13 and 14 for structural design requirements.

11.5.2 Submittals

Developer shall prepare the following items:

- Design signing roll plan
- Signing Plans
- Written justification to add, delete, or modify any signs on existing structures

Developer shall be responsible for providing all signing plan sheets and approved shop drawings in PDF format, to the Department.

11.5.3 Signing Database

Developer shall inventory all signs installed under this Project. The inventory shall include sign size, support type, the latitude/longitude and mile post location, pictures of the sign (front and back), and retroreflectometer readings for each sign. Developer shall enter the inventory information into a Microsoft Access database approved by the Department. Developer shall provide a database manual with descriptions of the database fields. Developer shall be responsible for updating this database for all signs within O&M Limits defined in the PPA.

11.5.4 Regulatory Signing Study

Developer shall be responsible for providing an engineering study to the Department that documents all regulatory signing (e.g., speed limits, truck restrictions, etc.) installed under this Project as part of Release-for-Construction Plans.

11.5.5 Sign Lighting

External sign lighting and related appurtenances, such as a sign walkway, will not be required for overhead signs. However, conduit shall be installed in overhead sign structure foundations for possible future lighting and shall connect to a lighting handhole placed near the base of the sign support. A grounding system shall be included.

11.6 Traffic Signals

11.6.1 Performance Requirements

Developer shall perform analysis to confirm the appropriate traffic control at all intersections within the Project Limits.

All traffic signals shall be designed to provide for the efficient movement of traffic (vehicular and pedestrian) in both the year of operation (2016) and the design year (2035).

Developer shall develop signal timing plans that optimize traffic flows and provide signal coordination with adjacent intersections and arterial roads. Traffic signals located at the following intersections shall be interconnected:

- Northbound I-69/Fullerton Pike ramp with southbound I-69/Fullerton Pike ramp
- Northbound I-69/Tapp Road ramp with southbound I-69/Tapp Road ramp
- SR 45/Liberty Drive with northbound I-69/SR 45 ramp, southbound I-69/SR 45 ramp, and SR 45/Basswood Drive

- SR 48/Gates Avenue with southbound I-69/SR 48 ramp, northbound I-69/SR 48 ramp and SR 48/Franklin Road
- Northbound I-69/SR 46 ramp with southbound I-69/SR 46 ramp

11.6.2 Design and Construction Requirements

11.6.2.1 Traffic Signal Design

Developer shall prepare a preliminary design in the form of traffic signal plan sheets for approval by the Department during Stage 1 submissions that includes all existing signal equipment and interconnect and displays all proposed signal equipment and interconnect necessary for the Project. The plan sheets shall also display all existing and proposed crosswalks necessary for the Project. Any required temporary maintenance of traffic signal plan, along with the associated phasing of signal construction, shall also be presented at this time.

11.6.2.2 Traffic Signal Plan Requirements

Developer shall prepare traffic signal Plans for any new traffic signals or modifications that are required. Traffic signal Plans shall be provided to the Department for Design Review in accordance with Section 3.

Existing traffic signal operation and detection shall be maintained during all phases of the roadway construction and all stages of MOT.

All permanent traffic signals shall use span, catenary, and tether support, unless otherwise approved by the Department.

11.6.2.3 Interconnect Plans

Developer shall prepare traffic signal interconnect Plans and include with traffic signal Plans submissions, as required. Interconnect plans shall be drawn at a scale of 1 inch = 50 feet. Developer shall obtain all existing interconnect information. Interconnect plans shall include controller cabinet locations, conduits, handholes, sampling stations, a wiring diagram, cables, construction details, and an equipment list that is in accordance with Developer's design and computer-aided design drawing (CADD) requirements.

Developer shall be responsible for Utility pole removals required when relocating existing interconnect. All interconnect shall be relocated prior to roadway construction to ensure that interconnect can be maintained throughout construction. Developer shall be responsible for the relocation of any existing fiber-optic cable impacted by construction. Splices shall not be permitted along interconnect runs. Developer shall be responsible for obtaining all Governmental Approvals and third party agreements required for placing interconnect on Utility poles and shall be responsible for all associated costs.

11.6.2.4 Utility Requirements

Developer shall be responsible for locating and marking all underground Utilities prior to any signal installation work. Department Utility conduits for lighting and traffic signals are not included in "call before you dig" database systems. Developer shall be responsible for all work, materials, and costs associated with obtaining power and maintaining power throughout construction for all traffic signals, including coordination with the power company and obtaining

power supply for all traffic signals and other electrical work required for the Project. Developer shall be responsible for completing all electrical-service application materials necessary for obtaining service from the appropriate power company. All materials shall be submitted to the power company and copied to the Department. Developer shall use 200A Metered Service Pedestals at all traffic signal locations, unless otherwise specified in the Technical Provisions. Developer shall be solely responsible for all Work and costs associated with obtaining communication cable and maintaining communication cable throughout construction for all signals. Metered Service Pedestals shall only be used to service traffic signal equipment and related intersection lighting unless otherwise accepted by the Department. Developer shall complete all paperwork, coordinate with the Utility Owner, pay the cost associated with the service installation, and schedule all Utility connections.

11.6.2.5 Sight Distance Requirements

Developer shall ensure all traffic signal heads for temporary and permanent conditions can be seen by all approaching traffic at the required sight distance, at all times during and after Construction Work. Developer shall prepare and present sightline plans for all traffic approaches for review and written comment by the Department with traffic signal Plan submissions.

Developer shall prepare and present to the Department for review and written comment, with traffic signal Plan submissions, separate sightline plans and profiles for each MOT phase that has different sightlines approaching a traffic signal. If sightlines do not meet the IMUTCD requirements, Developer shall provide a recommendation for meeting the requirements to the Department.

11.6.2.6 Materials

All traffic signal equipment installed under the Project shall be new and designed and constructed in accordance with the Project Standards. Existing traffic signal equipment may be modified or relocated at the same intersection if it meets Project Standards. All traffic signal equipment shall be approved by the Department.

All pedestrian signal indications and detectors shall meet IMUTCD standards for accessible pedestrian signals and detectors. Any existing pedestrian signal indications or detectors that do not meet these standards shall be replaced.

Any new traffic signal interconnect installed under the Project shall use wireless communications. Existing fiber-optic interconnect may remain in place if it meets the Project Standards.

11.6.3 Temporary Traffic Signals

Developer shall provide temporary traffic signals as required by the Maintenance of Traffic Plans. Developer shall perform all studies as necessary for the placement of temporary traffic signals and present all information to the Department for review and written comment.

Video detection will be allowed as a temporary replacement for existing traffic detectors for a period of up to 30 days. Other methods of temporary detection are required when the signal is to be operational for longer time periods or where detection does not currently exist.

11.6.4 Traffic Control Device Verification – Signals

Developer shall schedule meetings with the Department to verify traffic control device work as follows:

- At the completion of all cabling and wiring and prior to electrical Utility service connection.
- Prior to traffic control device activation.

11.7 Lighting

11.7.1 Design and Construction Requirements

Developer shall design and install interchange lighting at the I-69 interchanges with Fullerton Pike, Tapp Road/2nd Street/SR 45, 3rd Street/SR 48, SR 46, Sample Road, and Liberty Church Road. Developer shall maintain existing highway illumination in all other locations. For existing lighting, the maximum outage time for luminaires shall be 24 hours. All flexible conduit is required to be galvanized steel, polyvinyl jacketed, and watertight.

11.7.1.1 Design Criteria

Developer shall prepare and present lighting calculations for Department approval with lighting Plan submissions. Developer shall design and install lighting structures in accordance with the Project Standards, Utility Owner requirements and with the aesthetic guidelines in Section 5. Specific criteria are as follows:

11.7.1.1.1 New Roadway Lighting

High-mast lighting is allowed on the Project. However, Developer shall coordinate the heights with the Department and the U.S. Federal Aviation Administration (FAA), comply with FAA requirements, and apply for permits if necessary. The mounting height for high-mast towers at the interchanges shall be between 80 feet and 200 feet. The mounting height of the conventional fixtures shall range from 40 feet to 50 feet. The recommended mounting height for conventional fixtures is 40 feet. Power supply for lighting shall be installed in separate conduits and on independently metered circuits.

11.7.1.1.2 Existing Roadway Lighting

In locations where the Project will impact existing roadway lighting, the existing structures shall be replaced by Developer. Lighting shall incorporate the same luminaire and pole type as existing to maintain consistency. With the exception of high-mast lighting, existing lighting may be relocated and reused if it meets the Project Standards. Existing high-mast lighting shall not be relocated or reused on the Project. Developer shall design and construct the lighting system consistent with the operational and engineering requirements of the Utility Owner and Department. For locations where luminaires are attached to a Utility pole, Developer (as a part of the Utility relocation effort) shall contact the local Utility Owner to coordinate the relocation of the light fixture. Developer is responsible for coordinating and entering into agreements with the Utility Owner and paying for any and all related costs. Developer shall remove existing light poles that are no longer required due to construction of the Project. The equipment shall be the property of Developer upon removal. Developer shall notify the Department of the lighting being removed at least two weeks in advance of scheduled equipment removal.

11.7.1.1.3 Underpass Lighting

Developer shall provide underpass lighting to maintain roadway lighting continuity. The underpass lighting shall be in accordance with the criteria from AASHTO's *An Informational Guide for Roadway Lighting*.

11.7.1.1.4 Intersection Lighting

Developer shall combine intersection lighting with the traffic signal Plans whenever possible. All intersection lighting shall be prepared using the guidelines from the Department and the American National Standards Institute – *Illuminating Engineering Society of North America (ANSI – IESNA) RP-8-00, Annex D*, for the design of intersection lighting.

11.7.2 Lighting Roll Plans

The lighting roll plan shall include proposed locations for all lights and photometric calculations supporting the light locations. Developer shall provide spacing computations showing the average maintained illuminance. The calculations shall include uniformity ratios and point-by-point computations. Developer shall apply the light loss factor of 0.78 when computing photometrics.

11.7.3 Performance Requirements

All proposed lighting equipment shall be located such that it can be readily maintained. Lighting placed on traffic signal equipment shall be serviced from a metered service pedestal. Each luminaire mounted on a signal structure shall be equipped with a photocell. Developer shall provide voltage drop calculations for all circuits. The voltage drop for each circuit shall not exceed 10 percent for new circuits. A minimum of two branch circuits shall be used for each continuous succession of lighting structures. All lighting circuits shall have balanced lighting loads. Two conductor duct cables shall be used for all lighting circuits. Only the conductors that serve the lighting structures shall enter the foundation of the lighting structures. All other conductors shall remain unspliced and bypass the foundation. Developer shall furnish and install single conductor cables in conduit under all roadway surfaces. Single conductor cables shall be used any place cables are to be installed in conduit. Developer shall provide electrical manholes and connector kits to splice the conductors. No in-ground splices of electrical cables shall be permitted for any reason. No electrical manholes shall be placed in drainage ditches. Developer shall abandon existing conductors between poles that are to be removed. Any existing lighting structure that is impacted by the construction of this Project shall be disconnected and reconnected to its original power supply by Developer as part of this Project unless it is being removed. All abandoned cables shall be made safe. All light poles that are not protected by traffic barrier and are in the clear zone, as defined in the AASHTO *Roadside Design Guide*, shall be installed on a breakaway transformer base complying with the Project Standards. Light poles shall not be installed in front of traffic barrier. Residential shielding shall be provided with all lighting within 75 feet of a residential structure, where necessary to achieve the 0.01 fc illuminance requirement.

11.7.3.1 Plan Sheet Requirements

Developer shall prepare and present lighting Plans with a scale appropriate for the Project, generally 1 inch = 50 feet. The Plans shall include all the necessary elements as specified in the Chapter 14 of the IDM.

11.7.3.2 Temporary Lighting

Developer shall maintain all existing lighting within the Project Limits and temporary lighting necessary for the Project throughout Construction Work. If required to maintain the existing lighting levels in the Site area, Developer shall install and maintain temporary lighting (luminaires attached to wood poles). Temporary overhead electrical service is acceptable for non-breakaway poles. Developer shall remove temporary lighting when no longer needed. Developer shall be responsible for the power costs of any and all temporary lighting that may be required, and it is Developer's responsibility to schedule, coordinate, and pay for all Utility connections.

11.7.3.3 Electrical Service for Lighting

Developer shall be solely responsible for all Work, materials, and costs (including coordination with the power company) required to obtain power supply for all lighting and Work required for the Project. Developer shall be responsible for all electrical service application materials necessary for obtaining service from the appropriate power companies. All materials shall be submitted to the power company and copied to the Department. Developer shall contact all Utility Owners to fulfill requirements to determine the location of all existing and proposed Utilities, obtain power company requirements for service, and obtain power company approval for feed location(s). It is Developer's responsibility to complete all paperwork, coordinate with the Utility Owner, pay all costs associated with the service installation, and schedule all Utility connections so as to not adversely affect the Project Schedule.

Lighting systems owned by different jurisdictions shall have separate power sources derived from the Utility Owner. Exceptions shall require written approval and the agreement of all jurisdictions involved and shall require separate circuits.

11.7.3.4 Aesthetic Requirements

Developer shall provide lighting structures and luminaires that conform to the aesthetic guidelines provided in Section 5.

11.7.4 Traffic Control Device Verification – Lighting

Developer shall schedule meetings with the Department to verify traffic control device work as follows:

- At the completion of all cabling and wiring and prior to electrical Utility service connection.
- Prior to traffic control device activation.

11.8 Pavement Markings

Developer shall design and install new pavement markings and delineation on all routes within the Project Limits. Developer shall provide for modification to pavement markings outside the Project Limits that are rendered inaccurate, ineffective, confusing, or unnecessary by the Project. Developer shall design, install and maintain temporary pavement markings and delineation on all routes within the Project Limits until Final Acceptance.

11.8.1 Design and Construction Requirements

Pavement marking materials shall be installed in accordance with the Project Standards.

Crosswalks shall be provided across roads at all signalized and roundabout intersections within the Project Limits.

Developer shall install raised pavement markers on I-69 and adjacent ramps. Raised pavement markers shall not be installed on bridge decks. Spacing, colors, and arrangement of raised pavement markers shall conform to the Project Standards for permanently installed pavement markers. Raised pavement markers shall be new, snow-plowable markers conforming to the Project Standards. Raised pavement markers shall be used only to supplement pavement markings, not as a substitute.

Developer shall provide delineators on the outside shoulder of I-69 Mainline and on one side of each interchange ramp in accordance with the Project Standards. The delineator color shall match the color of the edge line. Delineators shall be provided along the outside of each curve on interchange ramps. Developer shall provide double or vertically-elongated delineators installed at 100-foot intervals along each acceleration or deceleration lane.

Delineators shall be used to mark all median crossovers on divided highways. The delineator shall be located to mark the far side of the opening for each direction of traffic. When post-mounted delineators are installed, flexible delineator posts shall be used instead of metal posts.

Barrier-wall delineators shall be used on each traffic-facing side of all median, roadside, and bridge barrier walls.

All proposed pavement markings shall be shown in the signing Plans and included in the signing Plan submissions for Department approval. The Plans shall show the color, size, location, and material type for markings within the Project Limits. The final pavement marking Plans shall be indicated on the signing Plan with the same scale as the signing Plan. The lanes shall be dimensioned based on the typical sections for the Project. Dimensions shall be included for each change in the roadway typical.

11.9 Traffic Operational Analyses – Procedures and Application

Developer shall assure that the Project provides acceptable traffic operation for the 2035 Design Year and for interim conditions. Traffic operations analysis shall be required for all freeways, ramps, weaving sections, ramp merge and diverge locations, and intersections within the Project Limits. Developer shall confirm the appropriate traffic control for all intersections and ensure that all traffic controls are properly warranted and requested in accordance with this Section 11 and the Project Standards.

11.9.1 Approved Analysis Techniques and Software

11.9.1.1 Highway Capacity Manual and Software

The Highway Capacity Manual and Software (latest version) shall be used to analyze all freeway mainlines, ramp junctions (merge and diverge locations), weaving sections, and intersections. Developer shall provide the Department with a summary of results on a line diagram of the proposed roadway configurations, including both the LOS and the volume-to-

capacity (V/C) ratio, as appropriate. Developer shall also provide the Department with a report and all calculation files on a CD to support the summary of results for review and comment with the Design Review submissions.

11.9.1.2 Synchro and SimTraffic

For corridors with multiple signalized intersections, Developer shall use Synchro and SimTraffic (latest version) to analyze corridor operations. Developer's timing plans shall consider corridor-wide cycle lengths and appropriate offsets. Developer shall provide the Department with a report, Synchro files, and all calculation files on a CD to support the summary of results for review and comment with the Design Review submissions.

11.9.1.3 Additional Software

Developer may elect to use CORSIM, VISSIM, or TransModeler (latest versions) simulation software to analyze traffic operations. Other software may be used for roundabout analysis with the approval of the Department. Use of this software shall be in addition to the Highway Capacity Manual and Software and Synchro/SimTraffic requirements listed in Section 11.9.1.1 and 11.9.1.2. Results will be considered by the Department in conjunction with the reports in Section 11.9.1.1 and 11.9.1.2.

11.9.1.4 Operational Assessment

It shall be Developer's responsibility to perform traffic analyses for the interim conditions and the proposed final design using the tools and techniques listed above, as appropriate. Developer shall use the 2035 AM and PM Peak Hour design volumes provided in the Final Engineer's Report (RID 01.1) to develop and test the Final Design. Unless otherwise identified in these Technical Provisions, Developer shall provide LOS equal to or better than the minimum LOS required in the Project Standards for all roadway facilities, including freeway mainline, ramps, weaving areas, streets, and intersections. Developer is not required to conduct 2035 traffic operations analysis for locations where the proposed traffic control and lane configurations are consistent with the Reference Design. Developer will be required to conduct traffic operations analysis for interim conditions where interim lane configurations are proposed to differ from those in the Design Year or where interim year traffic volumes are expected to exceed those in the Design Year. LOS at the following locations may vary from the Project Standards:

- At the intersection of SR 45 and Liberty Drive/Hickory Leaf Drive, an overall intersection LOS of "D" must be provided in the Design Year, but the LOS on Liberty Drive and Hickory Leaf Drive are not constrained.
- At the intersection of SR 48 and Gates Drive, an overall intersection LOS of "D" must be provided in the Design Year, but the LOS on Gates Drive is not constrained.
- At the intersection of the I-69 southbound ramps and SR 48, an overall intersection LOS of "D" must be provided in the Design Year, but the LOS for the southbound right turn movement and southbound approach are not constrained.

In addition to the LOS requirements, the capacity of all movements shall meet or exceed the 2035 design volumes.

Developer shall analyze all ramps to ensure that the queues do not back from the ramp terminus to the mainline freeway. Developer shall provide the Department with calculations for

Design Review showing the sight distance will be adequate for vehicles exiting the mainline freeway at highway speeds to see the back of the queue and decelerate to a stop condition.

Calculations shall be provided to the Department with an HCS analysis of the Final Design in accordance with Sections 11.9.1.1 and 11.9.1.2. Where an interpretation of the traffic analyses is required (e.g., if individual intersection movements do not meet minimum LOS standards but the overall intersection does), the Department's approval will be at its sole discretion.

Developer shall be responsible for reviewing the anticipated 2035 operating speed and proposed design speed for each segment of roadway and shall provide the Department with the operating and design speed differentials between adjacent lanes (i.e., mainline versus merging ramp) in tabular form, for Design Review.

11.9.2 Preparation and Submittal of Traffic Control Device Request

For the following improvements, Developer shall submit an official action to the Department for the Department's approval, copied to the Highway Management Deputy Commissioner in the Department with accompanying traffic operational analysis reports/documentation and signal warrant analyses:

- New traffic signals, intersection control beacons, or hazard identification beacons.
- The removal of existing traffic signals, intersection control beacons, or hazard identification beacons.
- The functional change of any existing traffic signal, such as adding or changing signal phases.
- Any type of signal pre-emption or priority.
- Any existing traffic signal modification, such as relocating poles, strobes, optically programmed heads, light emitting diodes (LED) heads, back plates, adding or shifting signal heads, the addition of accessible pedestrian signals and countdown pedestrian signals, etc.
- Additional signal detection or changes to existing detection.
- Signal detector repair/replacement as part of a reconstruction or resurfacing effort.
- All highway lighting or major change to an existing lighting system.
- All new overhead or cantilevered sign structures or modifications to existing sign structures.
- All revisions to the legend of major guide signs.
- Signing additions or changes within the Project Limits.
- Signing and pavement markings for new facilities and modifications to existing facilities.

All requests shall be submitted to the Department for Design Review prior to Developer proceeding with the design, installation, or modification of any traffic control device.

12 MAINTENANCE OF TRAFFIC (MOT), HAUL ROUTES, AND ACCESS

12.1 General

Maintenance of Traffic (MOT) shall be performed in a manner that minimizes construction, rehabilitation, and maintenance duration and impact to the traveling public. This section defines specific requirements, restrictions, and allowable closure durations for both travel lanes and ramps. The provisions of this Section 12 apply to: a) Construction Work; b) O&M During Construction; and c) O&M After Construction unless stated otherwise.

12.2 Standards and References

Developer shall design and construct the MOT, haul routes, and access in accordance with the applicable requirements of the PPA Documents, including Project Standards and this Section 12; Governmental Approvals; and applicable Laws.

12.3 Performance Requirements

12.3.1 Project-Wide Transportation Management Plan

Developer shall prepare, implement, and maintain one TMP for: a) and b) combined (Construction Work and O&M During Construction) and one TMP for c) (O&M After Construction). Each TMP shall include a Traffic Operations Plan (TOP) and a traffic management section for the Public Involvement Plan (PIP), and must be approved before initiation of any Construction Work or O&M Work, as applicable. IFA will provide Developer with a list of IFA representatives for the Project traffic management team to be included in Developer's TMP. Each TMP shall be developed in coordination with, and include procedures to communicate, all MOT phase installations and changes with emergency service providers, school transportation officials, and all affected local public agencies. Submittal requirements for the TMP and its components are included in Section 20 (Deliverables).

Each TMP shall be developed in coordination with and be consistent with the PIP and include procedures to communicate TMP information to the PI Coordinator for communication of all MOT work to the public prior to implementation of any MOT phase or phase change.

The Traffic Operations Plan (TOP) shall include:

1. Developer identification of a Maintenance of Traffic (MOT) Manager to coordinate all construction traffic impacts with IFA's PIP Manager and TMP team, as well as Developer's Certified Worksite Traffic Supervisor (CWTS) who is responsible to monitor daily MOT activities.

2. Descriptions of contact methods and response times of the CWTS to address any conditions needing attention during all hours.

3. Coordination with the Emergency Plan, including identification of staging areas where equipment or vehicles needed for incident clearance response can be stored and have reasonable and safe access to the construction zones. Developer shall have the necessary equipment on-Site to repair temporary barrier and/or to set up temporary

traffic control until the barrier can be repaired.

4. Procedures to identify and incorporate the needs of transit operators, Utility Owners, and business owners in the Project corridor, including Utility Owner access and business access signing.

5. Identification of measurable limits for the repair and replacement of traffic control devices, including pavement markings, as called out in the Standard Specifications.

6. A process to identify, design, and receive approval for all necessary temporary traffic signals.

7. A process to determine the need for revised traffic signal timings, and if revisions are required, detailed procedures for the development, approval, implementation, testing, and maintenance of all affected signals.

8. A work zone access management map and a construction haul route map for each construction phase.

9. Methods and frequency of inspection and maintenance of all traffic control throughout the Project Limits.

10. Provisions to provide continuous access to established truck routes and any hazardous material (hazmat) routes.

11. Procedures for modification of the MOT Plans as needed to adapt to current Project circumstances.

12.3.2 Temporary Traffic Control Plan

Developer shall prepare, submit, and implement a Temporary Traffic Control Plan (TTCP) for, at minimum, each Design Unit. Developer may develop a TTCP for multiple Design Units. TTCPs shall be included with each applicable RFC package. Developer shall prepare and implement a separate TTCP for each activity associated with O&M Work After Construction. TTCPs shall become part of the appropriate TMP as amendments once the TTCPs are approved by IFA.

The TTCP defines how Developer is to phase construction and detail all the required elements of the physical work zone. The TTCP for this Project includes queuing/delay analysis. Upon completion of queuing/delay analysis, MOT Plans and MOT Special Provisions shall be developed and included with the Released-for-Construction Design Documents. The MOT Plans shall include all major traffic shifts, lane closures, use of temporary roadways, temporary traffic signals, and access modifications to businesses and residences. The anticipated duration of each phase shall also be noted on the plan.

In addition to the requirements in the IDM, the TTCPs shall include the following information:

1. A cover page/title sheet sealed by a Registered Professional Engineer.

2. Standard Drawings

3. MOT Plans, with a traffic and mobility analysis performed for each phase of construction. Refer to Section 11.9 for analysis requirements. The MOT Plans shall detail phases and durations and shall identify all long-term lane closures and lane restrictions anticipated for the Project.

4. Descriptions of the design methods to be used for temporary roadways.

5. Detour and haul routes required for the purpose of Construction Work, including O&M During Construction and O&M After Construction. Developer shall obtain approval from local agencies for all proposed detour and haul routes and shall obtain, pay for, and comply with requirements of all necessary Governmental Approvals and agreements required for said routes.

6. Special Provisions that include a switching procedure between each controlled MOT phase change. The switching procedure shall consist of the methods, actions, and signing necessary to complete the switch and the number and duties of traffic personnel assigned to perform the switch.

7. Special Provisions that describe a process for transitioning from temporary signage and temporary pavement marking to permanent signing and permanent pavement marking.

8. Special Provisions that specify Developer coordination work with the construction and maintenance projects of Governmental Entities that are adjacent to or near the Project ROW. The Special Provisions shall include a coordination clause listing other adjacent or nearby construction projects. At a minimum, this shall include the projects listed in Section 1 (General Scope of Work).

9. Special Provisions that require Developer to maintain existing access to all properties within the Project Limits for the duration of the Construction Work, except as provided elsewhere in the PPA Documents. Appropriate information about access modifications shall be made available to the property owners as required in the PIP.

10. All information required in Section 12.4.8 (Freeway/Ramp/Roadway Closures and Restrictions) for single lane closures north of Sample Road.

The MOT Plans shall be prepared at an appropriate scale to facilitate IFA review and include the following components for each phase of construction:

1. The work area

2. Begin/end tapers

3. Work in vicinity of entrance ramps

4. Temporary pavements and, as applicable, structures

5. Locations of signs (existing, proposed, covered, and modified) and associated details

6. Roadway plan sheets showing all in-place traffic control devices that need to be retained, relocated, or removed and all temporary traffic control devices that need to be installed, retained, relocated, or removed for each phase of construction

7. Provisions for using temporary guardrail, temporary concrete barrier wall, or attenuators to protect the traveling public and to provide security of the Project site

8. Type and location of all pavement markings (temporary and permanent) to be installed, removed, or renewed for each phase and location of the final pavement markings

9. Plan insert sheets, including ingress/egress locations for Developer-Related Entities

10. Plan notes
11. References to applicable Project Standards
12. Detailed detour Plans, incorporating detour routes and alternatives specified in Section 12.4.4
13. Portable changeable message signs and advance notification signing locations
14. Temporary signal Plans for each phase of construction that involves a change to the signal. Temporary signal Plans shall include signal timing and phasing
15. Typical sections showing lane widths, pavement markings, channelizing devices, temporary concrete barrier (TCB), limiting stations, work area, drop-offs, etc.
16. Haul routes
17. Plan showing any detour routes or closures within or adjacent to historic sites and districts

12.3.3 Approved Analysis Techniques and Software for the TMP

Until Substantial Completion, the criteria used to determine the impact of proposed work zones shall be queue length and minimum delay times. Along with the techniques and software listed in Section 11, Developer may utilize Quewz-98 or similar programs to model the expected queue lengths and delay times that will be generated.

12.3.4 Maintenance of Traffic Analysis

Using no-build traffic data, or if not available, existing traffic counts supplemented by additional traffic counts by Developer, and analysis techniques described in Section 12.3.3, Developer shall test all MOT phases proposed on the Project to ensure no operational or safety issues are created by the TMP. The traffic alternative analysis shall be submitted to IFA with the MOT Plans and be subject to the same review requirements. The traffic analysis shall be summarized in report format, and all supporting documentation shall also be submitted to IFA. The requirements of this Section 12.3.4 (Maintenance of Traffic Analysis) apply through Substantial Completion.

The following thresholds for freeways and arterials shall be used by Developer in the evaluation of the work zone mobility impacts:

12.3.4.1 Existing SR 37, I-69, and Ramps

Developer shall evaluate work zone mobility impacts associated with each MOT phase and comply with the maximum queue length as shown in the TTCP queuing/delay analysis. Queue lengths for single lane closures of SR 37 and I-69, north of Sample Road shall be governed by the requirements of Attachment 12-1 (Queue Length Restrictions). The operation of SR 37 and I-69 shall be evaluated as a two-way arterial, except where intersections control, as described in Sections 12.3.4.2 or 12.3.4.3.

Ramps shall be evaluated as arterial roadways, except areas at ramp terminals, where Sections 12.3.4.2 or 12.3.4.3 apply. No queue from any ramp shall back up onto existing SR 37 or I-69 as a result of MOT phasing.

12.3.4.2 Signalized Intersections

If the existing LOS on each approach to a signalized intersection is between A and C, then the LOS during MOT operations on each approach shall not be reduced below a D with a control delay of up to 45 seconds. If the 45-second control delay is exceeded, alternative strategies shall be submitted to IFA for approval. If the existing LOS on each approach is D or worse, then the control delay during MOT operations on each approach shall not increase more than 30 percent. If the 30 percent threshold is exceeded, alternative strategies shall be submitted to IFA for approval.

12.3.4.3 Unsignalized Intersections

If the existing LOS on each approach to an unsignalized intersection is between A and C, then the LOS during MOT operations on each approach shall not be reduced below a D with a control delay of up to 30 seconds. If the 30-second control delay is exceeded, alternative strategies shall be submitted to IFA for approval. If the existing LOS on each approach is D or worse, then the control delay during MOT operations on each approach shall not increase more than 30 percent. If the 30 percent threshold is exceeded, alternative strategies shall be submitted to IFA for approval.

12.3.4.4 Local and other State Route Arterial Roadway Segments

The provisions of this Section 12.3.4.4 apply only to Construction Work, including O&M During Construction. If flagging operations are performed on a local or other state route arterial roadway segment, maximum delay shall be no greater than 10 minutes for any vehicle. In addition, maximum queue lengths as described in the IDM shall not be exceeded. At signalized intersections, an LOS on each approach shall be maintained at or above an LOS D with a control delay of up to 45 seconds.

If specific work activities and time periods preclude compliance with the threshold levels listed in Section 12.3.4, Developer shall submit a request for Deviation to IFA for approval in accordance with Section 5.2.4 of the PPA. All Deviations from the threshold levels shall be submitted as early in the design process as possible. The request for Deviations from the threshold levels shall include the following:

1. Project Location and Description:
    a. Project location and work required
    b. Existing condition
    c. Purpose for the threshold exception request, along with how long and what hours the lane closures will be in effect
    d. Recommendations to minimize impacts
2. MOT Alternatives – All potential options for MOT with descriptions and discussions of each, including the following:
    a. Advantages/disadvantages
    b. Estimated time frame

c. User and construction cost

d. Potential economic impact to communities and businesses

e. Ability to gain public buy-in and awareness of the impacts and means to mitigate those impacts

3. Traffic Analysis:

a. Queue/delay analysis

b. Percent diversion that is reasonable to expect for the Project location and conditions

c. Queues with expected percentage of traffic diverting

4. Detour Calculations:

a. If a detour is proposed, provide detour route description, detour map(s), and user cost created to travel the extra distance.

b. Provide capacity, volume, and queue length calculations for the critical node along the detour route.

c. Suggest improvements to the detour route to improve traffic flow on the route with the detour traffic.

5. Summary and Recommendations:

a. List alternatives in order of preference and explain why the alternative is or is not preferred.

b. Summarize alternatives in table format, including important comparison items such as maximum queue lengths, the number and width of open lanes, the length, dates and duration of construction period, incremental construction cost associated with each option, etc.

Developer shall monitor queues and delays during MOT operations. If the thresholds listed in Section 12.3.4 are being exceeded, Developer shall modify the MOT Plans to mitigate the queues and keep delays below the threshold levels. All proposed changes to the MOT Plans shall be submitted to IFA for review and comment.

12.4 Design and Construction Requirements

12.4.1 Design Criteria

The information listed below shall be incorporated into the MOT Plans and the TMP.

1. Design Speed

a. The design speed and posted speed on state highways shall be the existing posted speed limit on approaches to the work zone, with a maximum 10-mile-per-hour speed reduction within the work zone; The posted speed can be reduced an additional 10 miles per hour in the work zone using flashing worksite speed limit assemblies as shown in the Department Standard Drawings 801-TCDV-10 and 801-TCDV-11 and “When Workers Are Present” signing.

b. The design speed on non-state highway facilities shall be the existing posted speed limit on approaches to the work zone, with a maximum 10-mile-per-hour reduction of posted speed within the work zone. The posted speed can be reduced an additional 10 miles per hour in the work zone using flashing worksite speed limit assemblies as shown in the Department Standard Drawings 801-TCDV-10 and 801-TCDV-1 and "When Workers Are Present" signing.

2. Lane Widths

   a. The minimum MOT lane width shall be 11 feet on State, city, and county routes.

   b. The minimum MOT lane width shall be 10 feet on residential local roadways.

3. Uncurbed Edge of Pavement Widths

   a. All pavement edges shall be a minimum of 2 feet away from the edge of a travel lane.

4. Separation

   a. A minimum clearance of 2 feet between barrier and edge of travel lane is required.

   b. Temporary concrete barrier and approved end treatments shall be used to protect the motoring public from the work area within the Project Limits when work or equipment, including personal vehicles and trucks used for loading and unloading, are within an 8-foot offset of the travel lane. Portable concrete barrier or temporary guardrail shall be provided if the entire clear zone is not traversable or if hazards exist within the clear zone.

   c. Portable concrete barrier on bridge decks shall be installed per the Department Standard Drawings.

   d. On State highways, tubular delineators shall be used between opposite bounds to separate two-way traffic when opposing traffic is maintained on the same roadbed, in accordance the Department Standard Drawings.

5. Crash Compliance

   a. All work zone traffic control devices shall be compliant with National Cooperative Highway Research Program (NCHRP) 350 requirements.

6. Signing/Lane Shifts/Closures

   a. All MOT procedures shall be in accordance with the MUTCD.

7. Pavement Edge Drop-offs

   a. Drop-off conditions 3 inches or less shall be delineated by barrels, vertical panels, or tubular markers spaced every 40 feet or a distance in feet equivalent to two times the speed limit in miles per hour, whichever is less.

   b. Drop-offs greater than 3 inches shall comply with the following restrictions:

      i. When drop-off is a result of exacavations adjacent to traffic with a horizontal separation of 0 to 2 feet, the drop-off shall be limited to 500 feet in continuous

length per location unless positive protection is provided before excavation commences. Locations of drop-offs shall be separated by at least 1.0 mile.

ii. Shall be wedged with dense graded aggregate or HMA on a 3:1 (H:V) or flatter slope if horizontal separation is less than 8 feet between traffic and the drop-off or positive protection is provided. If a horizontal separation of 8 feet or greater can be achieved between traffic and the drop-off, no wedging is required. Developer shall provide the wedge prior to the stoppage of work at that location.

iii. Shall be delineated by barrels spaced every 40 feet or at an interval in feet equivalent to two times the speed limit in miles per hour, whichever is less.

c. Temporary drop-offs during working hours in which construction operations are taking place shall be kept to a minimum, and are restricted to off-peak hours.

8. Channelizing Devices

a. Channelizing devices approved for use on the Project are detailed in the Project Standards. Developer shall comply with Recurring Special Provision 107-C-208 regarding the utilization of drums or other channelizing devices for traffic control.

b. Temporary channelizing device spacing in tapers shall be a maximum of 40 feet center-to-center or a distance in feet equivalent to the speed limit in miles per hour, whichever is less. Device spacing in tangent sections of freeways and ramps (including curves) shall be a maximum of 80 feet center-to-center or a distance in feet equivalent to two times the speed limit in miles per hour, whichever is less. On local roadways, 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.

c. Developer shall provide, erect, and maintain channelizing devices, signs, barriers, and other traffic control devices used for MOT in acceptable condition, in accordance with the Project Standards.

9. Flashing Arrows and Variable Message Boards

a. Developer shall supply all flashing arrows and variable message boards necessary to maintain traffic for the Project. Upon completion of the Project, the flashing arrows and variable message boards shall remain the property of Developer.

10. Drainage shall be maintained at all times during all phases of Construction Work.

11. Traffic signals, either temporary or permanent, shall remain operational from beginning of implementation to end of implementation.

12. Peak hours are defined as 6 a.m. to 9 a.m. and 3 p.m. to 7 p.m.

The requirements of this Section 12.4.1 (Design Criteria) are applicable through Substantial Completion.

12.4.2 Traffic through the Construction Zone

Developer shall provide a CWTS on-site whose responsibility is to supervise and continuously monitor the installation and maintenance of all traffic control devices, under the supervision of the MOT Manager. Developer shall authorize the CWTS to direct traffic changes to ensure safe and continuous traffic flow and to direct traffic operations after a traffic incident has occurred. The CWTS shall inspect all traffic control devices at least once daily and shall provide for the repair or replacement of defective devices. The CWTS shall submit a weekly written report of the daily traffic control device inspections to IFA for review and comment. The report shall include comments on all MOT setups, including temporary signals, maximum queue lengths/delays, work zone modifications, MOT phase changes, incidents, repairs and replacements made and suggested improvements.

The CWTS shall be available at all times and be on-site within a half-hour of notification throughout the duration of the Construction Work. The minimum qualifications of the CWTS shall include certification as a certified worksite traffic supervisor by the American Traffic Safety Services Association (ATSSA), or an approved equal certifying organization.

Access to all businesses and residences shall be maintained at all times.

Developer shall design, place, and maintain all approved construction detour routes required for the purposes of Construction Work and O&M After Construction and shall obtain all necessary Governmental Approvals for detours from the appropriate Governmental Entities.

Developer shall be responsible for all needed construction and haul roads required for the delivery of materials required for the Project and shall obtain, pay for and comply with the conditions of all necessary Governmental Approvals from the appropriate Governmental Entities for temporary roadways, including Construction Work and, as applicable, haul routes.

Developer shall arrange and hold an initial MOT meeting with IFA and all affected Governmental Entities at least four weeks prior to initial installation of traffic control devices for any MOT phase and shall hold a MOT phase switch meeting with IFA and all affected Governmental Entities at least two weeks before any MOT phase switch.

Developer shall design all geometric aspects of temporary roadways for the accepted work zone design speed.

Developer shall coordinate the operation of portable changeable message signs with IFA. Changeable message signs shall be used four weeks in advance to denote changes to traffic patterns.

Developer shall not use local streets through residential neighborhoods for access to the Site without approval of the local jurisdiction. Appropriate MOT and flagging procedures shall be followed during all Construction Work, and O&M After Construction, including mobilization and demobilization activities. Deliveries and hauling to and from the construction Site shall be confined to the Project ROW and performed via designated haul routes along the Project alignment.

The requirements of this Section 12.4.2 (Traffic Through the Construction Zone) are applicable through Substantial Completion.

12.4.3 Construction Access and Haul Routes

Developer shall develop an Access and Mobility Plan depicting haul routes and access points 90-days after NTP1 and submit to IFA for approval in its good faith discretion. The Access and Mobility Plan shall depict how deliveries and hauling to and from the Project shall be performed via haul routes as permitted by IFA and the entity owning the haul route. Movement of materials from one location to another within the Project ROW shall be confined to the Project ROW and performed via haul routes, as permitted by IFA and the entity owning the haul route. Developer shall comply with the local agency's bonding requirements for haul roads.

Developer may use local streets for the following activities after obtaining all required approvals from the local jurisdiction:

- Local roadway improvements
- Utility Adjustments
- Construction Work and implementation of roadway detours

Construction vehicles used by Developer shall comply with any and all load restrictions and vehicle delineation requirements when used on roads open to the public.

Construction equipment shall 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 sidewalks and bike lanes/paths that are open to traffic.

Construction traffic will be allowed to cross roadways that intersect with the Mainline alignment as long as the crossing is maintained within the Project ROW. With IFA approval, proper flagging procedures and, as applicable, temporary traffic signals can be used to facilitate construction traffic crossing local roadways. At-grade roadway crossings are not allowed during the times identified in Table 12-1 unless prior written approval is granted by IFA.

Table 12-1: Construction Traffic Roadway Crossing Restrictions

Roadway	Day of the Week	Prohibited Crossing Times
All crossing roadways along SR37/I-69 from That Road to SR 46 inclusive	Monday through Friday	6 a.m. – 9 a.m. and 4 p.m. – 7 p.m.

12.4.4 Detour Routes

Developer 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 is returned to its normal pattern, the detour route shall be restored to a condition that is equivalent or better than the condition that existed before its use as a detour. All required pavement markings shall meet IMUTCD standards and local requirements.

Developer's detour routes in the City of Bloomington shall use the same or higher classification of street as the street being detoured, as defined in the City of Bloomington's Thoroughfare Plan.

12.4.5 Improvements to Existing Roadway Network

Developer shall videotape haul routes and detour routes before construction operations. Developer shall maintain these routes in a condition that is reasonably smooth and free from holes, ruts, ridges, bumps, dust, and standing water. Once the haul route and detour route is removed and traffic returned to its normal pattern, or construction operations are completed, the route shall be restored to a condition that is equivalent or better than the condition which existed before its use for this purpose. Developer shall include in the MOT Plans a schedule for restoring any damaged route to its preconstruction condition. All required pavement markings shall meet IMUTCD standards and applicable Laws and requirements.

12.4.6 MOT Manager

Developer shall identify an MOT Manager to perform the following:

- Coordinate MOT activities with IFA
- Implement traffic management strategies
- Provide an MOT report to IFA with each change in traffic phasing, including expected queue lengths/delays, a summary of expected operations, and MOT durations
- Be continuously available during construction until Final Acceptance of the Project and the elimination of all temporary traffic control and after Final Acceptance whenever temporary traffic control is required
- Supervise the activities of the CWTS

12.4.7 Restrictions for Construction Work and O&M During Construction

This Section 12.4.7 (Restrictions for Construction Work and O&M During Construction) shall apply only to Construction Work, including O&M During Construction. Developer's attention is directed to the provisions of Exhibit 10 to the Agreement related to Construction Closures and Exhibit 12 to the Agreement related to Noncompliance Events and that failure to comply with the restrictions in this Section 12.4.7 may result in deductions from the Substantial Completion Milestone Payment Amount.

Developer shall comply with the Department's Recurring Special Provision 108-C-585 regarding working restrictions during holiday periods, except as modified herewith. Developer will be permitted to work during holiday periods and Event Days, if desired, in accordance with road lane closure restrictions as listed in Table 12-3; however, Developer shall be required to suspend work associated with deliveries and off-Site hauling operations during holiday periods and Event Days. Developer shall not change traffic patterns, and shall suspend deliveries and off-Site hauling operations during the following local events: Indiana University home football games in Bloomington, Indiana; Indiana University student move-in days in August; Indiana University student move-out dates in May; and Indiana University commencement events. Developer shall coordinate with IFA and stakeholders regarding all restriction dates.

Construction operations using shoulder closures will be allowed (except Holidays), provided any resulting temporary drop-off conditions and signing requirements shall be addressed in the TMP.

Roadways within a blast zone may be closed during off-peak traffic hours for a maximum of 20 minutes at a time during blasting operations to execute the blast and perform any cleanup necessary to reopen the road for traffic for both directions of travel. Following any incident

where the debris cannot be cleared within the 20-minute requirement, Developer shall present to IFA for approval the proposed methods for controlling the blast and cleanup such that the 20-minute limit can be met before the next blast. After a blast requiring closure and cleanup, the through traffic delayed by the closure shall be allowed to clear before the next closure.

12.4.8 Freeway/Ramp/Roadway Closures and Restrictions

The requirements of this Section 12.4.8 (Freeway/Ramp/Roadway Closures and Restrictions) apply through Substantial Completion. Developer shall not close two consecutive interchanges/existing cross-roads during the same time frame. Developer shall not close access to existing SR 37 or Mainline unless alternative access is provided. Developer shall maintain two lanes each for northbound and southbound traffic at all times south of Sample Road, except for single lane closures during non-peak overnight times between 9 p.m. and 6 a.m. on SR 37 and Mainline.

Developer shall maintain two lanes each for northbound and southbound traffic north of Sample Road, at all times, except for:

- Single lane overnight closures (between 9 p.m. and 6 a.m.)
- Single lane daytime closures (between 6 a.m. and 9 p.m.), provided all the following conditions are met:
  - A single lane closure segment does not exceed 5 miles in length
  - The distance between adjacent single lane closure segments is at least 1 mile
  - No local (turn in or turn out) access is permitted at any location
  - No more than one interruption to flow such as a signalized crossing is permitted within a single lane closure segment
  - Developer demonstrates compliance with the maximum queue lengths set forth in Attachment 12-1 (Queue Length Restrictions)
  - Developer implements the queue monitoring and reporting protocols set forth in Attachment 12-1 (Queue Length Restrictions) throughout the period of single lane daytime closure and the maximum queue lengths set forth therein are not exceeded

Table 12-2 summarizes the allowable closures and restrictions for specified roadways in the Project area.

Table 12-2: Permitted Roadway Closure and Restricted Access Provisions

Facility	Allowable Construction Closures/Restrictions	Notes
West That Road	Maintain accessibility to SR 37 until Rockport Road overpass and the connection to Rockport Road are completed.	
Rockport Road	Intersection shall remain open during week of the Fern Hills National Conference, Southwest (usually first week in July)	Detour shall use That Road so that access to local quarries can be maintained.

Facility	Allowable Construction Closures/Restrictions	Notes
Fullerton Pike	East side shall not be closed at the same time that Rockport Road overpass and Tapp Road interchange is under construction.	
Judd Avenue	Close as soon as construction of the Fullerton Pike interchange commences.	
Yonkers Street	Close as soon as construction of the Fullerton Pike interchange commences.	
Tapp Road		Access to the medical park shall be maintained at all times.
2nd Street	No Construction Closure of all lanes is allowed during the Monroe County Fair (usually last full week of July). Traffic on West 2nd Street shall be maintained at all times with the following exception: During construction of City project constructing a roundabout at West 2nd Street & Weimer Road	No traffic restrictions on Tapp Road during construction of 2nd Street/SR 45 Interchange, unless it coincides with City's West 2nd Street & Weimer Road roundabout project.
SR 45	No Construction Closure of all lanes is allowed until Section 4 of I-69 is open between SR 37 and the SR 445 Connector Road. No closures allowed during the Monroe County Fair (usually last full week of July). Access to interchange shall be unrestricted during Tapp Road construction.	
3rd Street	No Construction Closure of all lanes is allowed. No lanes restrictions allowed during construction activity on the West 2nd Street/SR 45 interchange.	Access to Franklin Drive, Wynndale Drive, and Gates Drive shall be maintained throughout the Project. Access on West 3rd Street to and from the fire station shall be maintained at all times.

Facility	Allowable Construction Closures/Restrictions	Notes
SR 48	No Construction Closure of all lanes is allowed.	
North Packing House Road		Coordination with Indiana State Police location shall be required.
Vernal Pike	Signalized intersection with SR 37 shall remain open until Vernal Pike/17th Street overpass and associated access roads are complete and open to traffic	
Woodyard Road		Woodyard Road shall not be used for any local detours.
SR 46	No Construction Closure of all lanes is allowed	
Arlington Road	Coordination with Indiana University is required prior to any traffic restrictions. No Construction Closure of any lanes is allowed during Indiana University home football games.	
West Acuff Road		No through construction traffic to access SR 37 from West Acuff Road via Maple Grove Road.
East Acuff Road	Access to SR 37 shall be maintained until after Kinser Pike overpass is constructed and open to traffic.	
Kinser Pike	West side Kinser Pike access to SR 37 shall be maintained until all connections to overpass and overpass are complete and open to traffic or while access from Bottom Road is maintained.	Please note that Kinser Pike Bridge #46 over Bean Blossom Creek has a Gross Vehicle Weight Limit of 12 tons. Currently it is anticipated to be replaced on FY 2015. Detours should not be routed over this structure until replacement.
Connaught Road/Charlie Taylor Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed.	
Ellis Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed.	
Griffith Cemetery Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed.	

Facility	Allowable Construction Closures/Restrictions	Notes
Wylie Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed and Sample Road Interchange is completed.	
Showers Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed.	
Stone Belt Drive/Purcell Drive	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed.	
Wayport Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed and Sample Road Interchange is completed.	
Bottom Road	Access to SR 37 shall be maintained until after Kinser Pike overpass and associated access roads are constructed and open to traffic.	
Walnut Street	No Construction Closure of any lanes is allowed	
Wayport Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed.	
Sample Road	No Construction Closure of any lanes is allowed	
Simpson Chapel Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed and Sample Road Interchange is completed.	
Lee Paul Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed.	
Fox Hollow Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed and Sample Road Interchange is completed.	

Facility	Allowable Construction Closures/Restrictions	Notes
Crossover Road (existing south access)	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed and Chambers Pike overpass is completed.	
Crossover Road (existing north access)	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed and Chambers Pike overpass is completed.	
Chambers Pike East	No Construction Closure of any lanes is allowed	
Sylvan Lane/Mann Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed.	
Sparks Road	Access to SR 37 shall remain open until local access to Chambers Pike is completed and Chambers Pike overpass is completed.	
Burma Road	Access to SR 37 shall remain open until local access road adjacent to this roadway is completed and Sample Road Interchange is completed.	
Liberty Church Road	No Construction Closure of any lanes is allowed.	
All other roads with direct access to SR 37, Private and Commercial Access Drives (various)		Close as soon as alternative access is provided or drive associated with total-take parcel(s) is secure, whichever is applicable.

For the roads in Table 12-2, a Construction Closure is acceptable provided that: the traffic restriction is identified in an approved TMP; the Construction Closure complies with the conditions set forth on Table 12-2.

For all other roads within the Project Limits not itemized on Table 12-2 above, a Construction Closure is acceptable provided that: the traffic restriction permits the continued use of a single lane; and the traffic restriction is identified on a properly submitted and approved TMP showing the use of the appropriate signs and flaggers.

12.4.9 Notification and Coordination

The MOT Manager shall notify IFA at least 28 days before the start of any construction activities that would affect traffic operations, including placement or relocation of work zone signs.

For all Construction Work and O&M After Construction the MOT Manager shall notify IFA and the others listed in the TMP and this Section 12 in writing of all traffic restrictions and upcoming MOT changes. Developer shall ensure the written notification is submitted in accordance with Table 12-3. This notification shall be received by IFA before the physical setup of any applicable signs or message boards.

Information shall include all construction and maintenance 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 IFA. A summary of the notification time and requirements for closures and restrictions is provided in Table 12-3.

Table 12-3: Road and Lane Restriction Notification Requirements

Item	Duration of Closure	Notification Time Frame
Ramp and Road Closures	Greater than 2 weeks	28 business days before closure
	Greater than 12 hours and less than 2 weeks	7 business days before closure
	Less than 12 hours	2 business days before closure
Ramp and Road Closures impacting: • school access and/or bus route • transit system operations	All closures	28 business days before closure
Lane Closure/Restrictions	Greater or equal to 2 weeks	7 business days before closure
	Less than 2 weeks	2 business days before closure

Any unforeseen conditions not specified in the MOT Plans or TTCPs requiring traffic restrictions shall also be reported to IFA using the above table.

A pre-MOT meeting between IFA and Developer shall be held a minimum of 10 Business Days before beginning Construction Work or executing any change of MOT staging. This meeting shall include IFA and any Developer subconsultants involved with temporary traffic control.

Developer shall prepare a point of contact list that identifies current contact information for Key Personnel to include the following agencies affected by the Project: local fire/police departments, local school districts, mass transit agencies, state or community colleges, and 911 dispatch centers.

13 GEOTECHNICAL

13.1 General

Developer shall design and construct the geotechnical Work including subsurface explorations, investigations, testing, and analyses in accordance with the Project Standards and References cited herein and in accordance with this Technical Provision. Developer shall conduct geotechnical Work and reporting in accordance with Chapter 107 of the IDM.

13.2 Standards and References

Design and construct the geotechnical Work in accordance with the applicable requirements of the PPA Documents, including Project Standards and this Section 13; Governmental Approvals; and applicable Laws. The geotechnical engineering investigations, analyses and design of geotechnical elements shall be performed in accordance with the IDM, INDOT *Geotechnical Manual*, INDOT *Geotechnical Design Memoranda*, AASHTO *Manual on Subsurface Investigations*, FHWA *Geotechnical Engineering Circular No. 5: Evaluation of Soil and Rock Properties*, AASHTO *LRFD Bridge Design Specifications*, and other applicable FHWA publications.

13.3 Design Requirements

13.3.1 Geotechnical Subsurface Exploration

13.3.1.1 Preliminary Subsurface Data

Preliminary geotechnical data obtained by IFA for the Work are included as Reference Information Documents. Developer is responsible for interpreting the geotechnical data provided and satisfying itself as to the suitability and sufficiency of the geotechnical data for meeting the geotechnical requirements of the Project.

13.3.1.2 Subsurface Exploration

Developer shall perform subsurface exploration and testing necessary to satisfy Project requirements and support their design approach and construction methods. Developer is responsible for the sufficiency, reliability, and accuracy of their Work and for determining the form and nature of the subsurface conditions of the Project. Developer's geotechnical investigation shall be performed by an INDOT Office of Geotechnical Services approved geotechnical consultant.

Developer shall submit a subsurface exploration and testing program identifying all field and laboratory testing to be performed by Developer in establishing the geotechnical conditions and parameters to be used for design and analysis. Developer shall submit their subsurface exploration and testing program to IFA for review and comment. At a minimum, the submittal shall include a rationale for the development of the program, parameter selection, and descriptions of the methods of analyses.

Developer shall use only subsurface investigation techniques described in the AASHTO *Manual on Subsurface Investigations* and the following:

1. K_o blade
2. Prebored pressuremeter (ASTM D-4719)
3. Electronic and piezocone testing (ASTM D-5778)
4. Mechanical cone penetrometer (ASTM D-3441)
5. Dilatometer test probes (ASTM D-6635)

K_o testing shall be in accordance with the manufacturers' recommended procedures which shall be submitted to IFA as part of the subsurface and testing exploration program.

Developer shall selectively locate supplemental foundation borings on the basis of field observations, design considerations, and the minimum criteria specified in Table 13–1. Developer shall conduct additional investigations if the geologic conditions warrant. The INDOT *Geotechnical Manual* shall hold precedence in areas where it stipulates greater and additional requirements.

Table 13–1: Required Foundation Borings for Foundation Support Type

Application	Minimum Number and Location of Exploration Points	Minimum Depth of Exploration
Retaining Walls	A minimum of one exploration point for each retaining wall. For retaining walls more than 100-feet in length, exploration points shall be spaced every 100-feet with locations alternating from in front of the wall to behind the wall. For anchored walls, additional exploration points in the anchorage zone spaced at 100-feet. For soil-nailed walls, additional exploration points at a distance of 1.0 to 1.5 times the height of the wall behind the wall spaced at 100-feet.	Investigate below bottom of wall at least to a depth where stress increase due to estimated foundation load is less than 10 percent of the existing effective overburden stress at that depth and between one and two times the wall height. Exploration depth shall fully penetrate soft highly compressible soils, (e.g., peat, organic silt, or soft fine-grained soils), into competent material of suitable bearing capacity, (e.g., stiff to hard cohesive soil, compact dense cohesionless soil, or bedrock).
Wing Walls	A minimum of one boring for each wing wall. For wing walls in excess of 75-feet in length, refer to retaining walls, above.	Same as retaining walls.
Noise Walls	A minimum of one boring for each noise wall. For noise walls in excess of 75-feet in length, see retaining walls, above.	Same as retaining walls.
Shallow Foundations	For substructure widths less than or equal to 100-feet, a minimum of one exploration point per substructure. For substructure widths greater than 100-feet, a minimum of two exploration points per substructure. Additional	Depth of exploration shall fully penetrate unsuitable foundation soils (e.g., peat, organic silt, or soft fine-grained soils) into competent material of suitable bearing resistance (e.g., stiff to hard cohesive soil or compact to dense cohesionless soil or bedrock).

Application	Minimum Number and Location of Exploration Points	Minimum Depth of Exploration
	exploration points shall be provided if variable or erratic subsurface conditions are encountered.	Depth shall at least be to a depth where stress increase due to estimated foundation load is less than 10 percent of the existing effective overburden stress at that depth. If bedrock is encountered before the depth required by the second criterion above is achieved, exploration depth shall be great enough to penetrate a minimum of 10 feet into the bedrock, but rock exploration shall be sufficient to characterize compressibility of infill material of near-horizontal to horizontal discontinuities.
Deep Foundations	For substructure widths less than or equal to 100-feet, a minimum of one exploration point per substructure. For substructure widths greater than 100-feet, a minimum of two exploration points per substructure. Additional exploration points shall be provided if variable or erratic subsurface conditions are encountered.	In soil, depth of exploration shall extend below the anticipated pile or drilled shaft tip elevation a minimum of 20-feet, or a minimum of two times the maximum pile group dimension, whichever is deeper. All borings shall extend through unsuitable strata such as unconsolidated fill, peat, highly organic materials, soft fine-grained soils, and loose coarse-grained soils to reach hard or dense materials. For piles bearing on rock, a minimum of 10-feet of rock core shall be obtained at each exploration point location to verify that the boring has not terminated on a boulder. For drilled shafts supported on or extending into rock, a minimum of 20-feet of rock core, or a length of rock core equal to at least three times the shaft diameter for isolated shafts or two times the maximum shaft group dimension, whichever is greater, shall be extended below the anticipated drilled shaft tip elevation to determine the physical characteristics of rock within the zone of foundation influence.
Roadway Subgrade and Pavement Design	The spacing between borings along the roadway alignment shall not exceed 500-feet. The selected spacing and location shall depend on the geologic complexity and subsurface variability.	Minimum 10-feet below proposed subgrade elevation for cuts and minimum 10-feet below existing ground surface for fills.

Application	Minimum Number and Location of Exploration Points	Minimum Depth of Exploration
Roadway Embankments	The spacing between borings along the roadway alignment shall not exceed 300-feet. The selected spacing and location shall depend on the geologic complexity and subsurface variability. A minimum of three borings in a section transverse to the roadway alignment are required where embankment fill will exceed 20-feet to model the existing geologic conditions for stability analysis.	Extend borings a minimum depth equal to twice the embankment height, or to a depth where stress increase due to estimated embankment load is less than 10 percent of the existing effective overburden stress at that depth, unless a hard stratum is encountered above this depth. Where soft strata are encountered that may present stability or settlement concerns, the borings shall extend to hard material. Embankments over soft ground shall include deeper and, as applicable, additional borings to determine the limits of soft deposits.
Roadway Cuts	Minimum spacing shall be the same as for roadway embankments. Additional borings shall be performed as needed based on the geologic complexity. A minimum of one boring shall be performed for each cut slope. At critical locations and at cuts deeper than 20-feet, provide a minimum of three borings in the transverse direction to model the existing geological conditions for stability analyses.	Borings should extend a minimum of 10-feet below the anticipated depth of the cut at the ditch line. Boring depths shall be increased in locations where base stability is a concern due to the presence of soft soils, or in locations where the base of the cut is below groundwater level to determine the depth of the underlying pervious strata.
High-Mast Highway Signs, High Mast Lighting	In accordance with AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. At a minimum, one boring shall be made at each defined location.	Borings shall extend a minimum of 40-feet into suitable soil or 10-feet into competent bedrock. Other criteria are the same as for deep foundations.
Note: All foundation borings shall be within 25 feet of the substructure unit to be applicable.		

For shallow foundations in karst, the minimum depth of exploration shall be the greater of that shown in Table 13-1 or 20-feet below the bottom of foundation.

All geophysical investigations shall be planned and performed under the direct supervision of a geophysicist with a minimum of 10 years of experience. All boring and in-situ testing inspection shall be performed by field inspectors who have passed the NHI Subsurface Investigation Qualification Course (#132079) and are either a degreed engineer or geologist; or have a minimum of two years of field experience in the inspection and reporting of field sampling and testing of similar size and content. All field investigations and laboratory testing shall be performed under the direct supervision of a Registered Professional Engineer, with a minimum of five years of experience in the performance and supervision of geotechnical engineering projects.

Developer shall determine the coordinate location, station, and offset from the mainline and ground surface elevation for each boring and other test probes and show the information on the individual boring logs.

Soil classification shall be performed in accordance with the INDOT Standard Specifications Section 903 – Classification of Soils, and AASHTO Standard Specification Designation M145.

Final boring and rock core logs shall be prepared and presented using gINT software as supplied by Bentley Systems Inc. IFA will provide the electronic template for the latest version of gINT.

The soil and rock samples obtained by Developer for the supplemental subsurface investigation shall become the property of IFA. Developer shall, at the request of IFA, deliver all samples to a location to be coordinated with IFA.

Boreholes shall be suitably covered for 24 hours until obtaining the 24-hour water readings. After the 24-hour water level reading is taken, abandon boreholes as directed in the INDOT Geotechnical Manual and according to the INDOT Aquifer Protection Guidelines. Spoils shall be evenly distributed to the surrounding area when possible or otherwise disposed of when distributed around the area is not possible.

13.3.1.3 Laboratory Testing

After collecting soil and rock samples, Developer shall perform laboratory tests to quantify material properties and verify design assumptions. Sufficient testing shall be performed so that Developer is satisfied that the test results are representative and characterize the in-situ conditions. All standard soil and rock sample laboratory testing shall be performed in accordance with the appropriate AASHTO Standard Specifications Test Designations or the appropriate Indiana Test Methods. All laboratory testing shall be performed by INDOT approved laboratories with AASHTO Materials Reference Laboratory certification for each specific test performed.

13.3.1.4 Geotechnical Planning Reports

Developer shall prepare geotechnical planning reports for individual Project elements or groups of Project elements based upon the D&C Work priority. Developer shall submit geotechnical planning reports to IFA for review and comment. The geotechnical planning reports shall include a detailed method statement describing the general philosophy and methods of investigation, preliminary design and analysis, and the selection of the anticipated means of construction for the included Project elements. The method statement shall indicate how material and design details are chosen to match selected construction methods and construction details and the soil, rock, and groundwater environment for the Site.

For each geotechnical planning report, Developer shall include the following technical information, as a minimum:

1. Description of geology and various ground types to be encountered along the alignment.
2. A description of the geotechnical information that was collected and analyzed in developing Developer's geotechnical planning report.

3. Assessment of the engineering properties of all soil and rock types, including the expected average and range of soil strengths and deformation properties and the preliminary design parameters for all soil and rock types.

4. A narrative describing the interpretation of the pertinent geotechnical data used as a basis for preliminary selection, design, and installation of the proposed foundation elements.

5. A description of the planned supplemental subsurface investigation.

6. Define the investigation, engineering, and design approach that will be followed in order to develop the most technically and environmentally acceptable and durable foundations, cut-and-fill slopes, retaining structures, pavements, stormwater management facilities, and geotechnical designs for the elements included in the geotechnical planning report.

13.3.2 Geotechnical Design

13.3.2.1 Design of Bridge Foundations

13.3.2.2 Shallow Foundations

Shallow foundations are limited to spread footings for isolated columns, combined footings for supporting the load from more than one structural unit, strip footings, and mats or raft foundations beneath an entire structure or substructure area.

Shallow foundations may be used where there is a suitable bearing stratum near the surface and where there are no highly compressible layers or soils susceptible to collapse or expansion below. Shallow foundations shall not be placed in the reinforced portion of MSE abutments or where the foundation could be adversely affected by scour.

Developer shall investigate for the presence of detrimental substances in soil or groundwater, including but not limited to chlorides and sulfates, and shall design foundations compatible with these conditions.

The effects of adjacent foundations, variable groundwater conditions, and surcharge loads shall be accommodated when evaluating foundation settlements and bearing capacity.

13.3.2.2.1 Bearing Capacity

Shallow foundations shall be analyzed for bearing capacity to confirm that the underlying soil and/or bedrock can resist the footing loads without bearing capacity failure. A maximum resistance factor of $\emptyset_b = 0.45$ shall be used for bearing capacity (factored bearing resistance) of shallow foundations.

13.3.2.2.2 Settlement

Analyses shall be conducted to estimate the total and differential soil settlement induced by the foundation loads. Immediate settlements for granular soils and immediate, primary, and secondary consolidation settlements for cohesive soils shall be analyzed. Shallow foundations shall be designed to limit settlements within the serviceability limits of the structure or below the maximum allowable limits, whichever is less.

13.3.2.2.3 External Stability

Shallow foundations shall be analyzed and constructed for external stability. External stability analyses shall include analysis of overturning, sliding, eccentricity, and global failures. Shallow foundations shall be designed such that the resultant load falls within the middle third of the foundation.

13.3.2.3 Deep Foundations

Deep foundations shall be used where the soil and/or bedrock is not suitable for use of shallow foundations or where scour or erosion is anticipated.

Deep foundations are limited to driven steel piles or drilled shafts. Timber piles, precast prestressed concrete piles, auger cast in place, rammed aggregate piers, screw piles, or existing foundations shall not be used for new structures.

Drilled shafts shall be designed and constructed in accordance with the AASHTO *LRFD Bridge Design Specifications*, IDM, INDOT *Geotechnical Manual*, INDOT *Geotechnical Design Memoranda*, and Recurring Special Provision 728-B-203. The Developer shall account for interaction effects between adjacent drilled shafts spaced closer than 4.0 shaft diameters. This shall include both design and construction effects.

Piles shall be designed to account for all static and cyclic loads, including load reversals, and shall include an appropriate reduction factor to the nominal capacity of the pile or pile group to account for load reversal. Resistance factors of $\emptyset_{qp}$ = 0.50 for tip resistance in rock and $\emptyset_{qs}$ = 0.55 for side resistance in rock shall be used in accordance with Section 10.5.5.2.4 of the AASHTO *LRFD Bridge Design Specifications*. The maximum resistance factors for driven piles shall be $\emptyset_{dyn}$ = 0.70 if the dynamic pile load test (INDOT Standard Specifications Section 701.05 (b)) is used for field verification and determination of nominal driving resistance or $\emptyset_{dyn}$ = 0.55 shall be used if the dynamic formula will be used to determine the nominal driving resistance according to the INDOT Standard Specifications Section 701.05(a).

13.3.2.3.1 Axial Capacity

Deep foundations shall be analyzed for axial capacity. The axial capacity of driven piles shall be verified as defined in INDOT Standard Specification Section 701.

13.3.2.3.2 Group Spacing and Performance

The design of deep foundations shall include material properties of the penetrated strata, type of foundation, and group effects due to the spacing of foundation elements.

13.3.2.3.3 Settlement

The design of deep foundations shall accommodate the total and differential settlement caused by the structure loads. The settlement of individual deep foundation elements and of pile groups shall be estimated. The foundation shall be designed and constructed to limit the settlement within the serviceability limits of the structure or below the maximum allowable limits, whichever is less.

13.3.2.3.4 Downdrag (Negative Skin Friction)

The design of deep foundations shall accommodate the effect of negative skin friction from existing ongoing ground settlement, construction dewatering, variable groundwater conditions, the placement of fill or embankments, or pile installation. Downdrag loads shall be determined by accounting for the load transfer distribution along the deep foundation element as well as the group layout.

To reduce downdrag forces, corrugated metal sleeves or bituminous coatings may be used. Friction-reducing rings welded on steel pipe piles to reduce downdrag shall not be used.

13.3.2.3.5 Lateral Load Capacity

Deep foundations shall be designed to adequately resist the lateral loads transferred to them from the structure without exceeding the allowable deformation of the structure or overstressing the foundation elements. Refer to Section 14 (Structures) for allowable lateral deformations. The lateral load resistance of the individual and group of deep foundation elements shall be analyzed and included in the design. The analysis shall accommodate non-linear soil pressure-displacement relationships, soil/structure interaction, group action, groundwater, and cyclic and static and dynamic load conditions. The deep foundation performance evaluation shall include the determination of vertical and horizontal movements, rotation, axial load, shear, and bending moment for the foundation elements and the bending stresses in the batter piles due to the weight of settling soils. Equivalent points of fixity shall be determined using the equivalent stiffness method accounting for the soil-structure p-y stiffness and the equivalent fixed end method.

13.3.2.4 Design of Retaining Walls and Retaining Wall Foundations

Top-Down walls shall be designed in accordance with the AASHTO *LRFD Bridge Design Specifications*, *IDM*, and INDOT Standard Specification 734.

Where soil nail, tie-backs, or ground anchors are required for the resistance of lateral loads, the elements shall be designed in accordance with either FHWA Geotechnical Engineering Circular No. 7: Soil Nail Walls or Geotechnical Engineering Circular No. 4: Ground Anchors and Anchored Systems.

13.3.2.4.1 Vertical Loads

The loads used in the design of permanent Work shall be in accordance with the requirements of the Project Standards, except where herein modified or augmented.

13.3.2.4.2 Lateral Earth Pressure

The design of the retaining structures shall be based on the maximum lateral pressures that will develop behind the structures. The saturated densities shall be used for soil unless the location is above the standing water table.

Hydrostatic pressure induced by the groundwater table, when present, shall be included in the lateral pressures. Additional hydrostatic pressures and variations in groundwater conditions due to drainage, flooding, and rapid drawdown conditions shall be accommodated in the design of retaining structures.

13.3.2.4.3 Shallow Foundations

Shallow foundations for retaining walls shall be designed to maintain wall settlements (total and differential) within the service limits of the structure. For MSE walls, shallow foundations shall be designed to maintain wall settlements (total and differential) within the applicable tolerances specified in FHWA *Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes.*

13.3.2.4.4 External and Internal Stability

The external and internal stability shall be in accordance with the requirements of the relevant Project Standards.

13.3.2.4.5 Deep Foundations

Deep foundations for retaining walls shall be designed in accordance with Section 13.3.2.3.

13.3.2.5 Design of Fill Embankments

13.3.2.5.1 Slope Stability

The analyses, design, and construction of soil and rock embankments shall accommodate the effects of deterioration and loss of soil resistance due to local climatic and construction conditions, and the natural tendencies of the geologic materials of which they are constructed. All slopes shall be designed to minimize erosion by rainfall and runoff. Adequate drainage and erosion control provisions shall be incorporated in the design and construction of the embankments. Subsurface drainage shall be provided for all fill slopes greater than 15 feet in height that do not have graded drainage at the top of the slope. Subsurface drainage may also be required on all other slopes depending upon the analysis of the slope design.

Slope stability analyses shall be conducted using a computer program accepted in the Project Standards. Each embankment configuration and slope shall be analyzed for potential circular and wedge type failures. The evaluation of global slope stability shall accommodate potential seepage forces, water infiltration, surficial water runoff, and any weak deposits and seams that are adversely impacted by water flow. The global stability analyses shall account for the use of buttressing, placement of select material, or improvements to the foundation material of the embankment, especially at the toe of slope near ponds, wetlands, streams, and other locations of poor materials. A maximum resistance factor of 0.77 (i.e., a minimum factor of safety of 1.3 shall be required under static loads for permanent embankment slopes for both global stability and surficial (shallow) stability analyses. In addition to global and surficial stability analyses, Developer shall provide stability analyses for the rapid drawdown condition with a maximum resistance factor of 0.9 (i.e., a minimum factor of safety of 1.1) for all slopes where rapid drawdown conditions may occur.

Developer shall coordinate landscape features to account for landscaping, revegetation, and, as applicable, reforestation operations to address potential adverse impacts and reductions in the factor of safety for fill embankment slopes for the as-built condition. At these locations, Developer's geotechnical engineer shall perform Site-specific global stability studies for the landscaping condition, which may require pre-emptive measures such as localized areas of reinforcement and, as applicable, localized areas with buttressing at the toe of slope to maintain the required factors of safety.

13.3.2.5.2 Settlement

Analyses shall be conducted to estimate the soil settlement induced by the embankment loads. Immediate settlement in granular soils and both immediate and consolidation settlements in cohesive soils shall be accommodated. Embankments shall be designed to keep estimated total long-term settlements limited to 2 inches during a period of 50 years after the completion of the pavement construction. For soft-ground situations, refer to Section 13.3.2.6.

13.3.2.6 Design of On-Site Soil Improvement

The use of soil improvement techniques to increase soil strength and reduce compressibility in order to decrease resistance factors (i.e., increase the factors of safety) for external and internal stability and reduce settlements to the allowable range are allowed. Developer shall demonstrate the suitability of the proposed methods for local conditions.

All soil improvement systems shall be designed using current practices and procedures. The performance of all ground improvement techniques shall be verified with a pre-production field testing program. The testing program shall be developed to demonstrate that the proposed methods and design will provide sufficient ground improvement to satisfy the specified requirements.

13.3.2.7 Design of Permanent Cut Slopes

Geotechnical analyses of soil cut slopes shall be performed to assess soil slope stability along new and existing roadway cuts. Potential circular and wedge type failure modes shall be analyzed for each soil cut and each slope configuration. A geotechnical analysis of cut slopes shall be performed using an appropriate slope stability computer program.

Permanent soil cut slopes shall be no steeper than 2:1 (H:V), with a maximum resistance factor of 0.67, (i.e. a minimum factor of safety from limit equilibrium analysis of 1.5). At soil/rock interfaces or at changes in slope, Developer shall construct benches that are a minimum of 15 feet wide.

For permanent cut slopes in soft rock steeper than 2:1 (H:V), Developer shall provide the following:

1. An analysis demonstrating the stability of the slope.
2. A 20-foot minimum width rockfall catchment ditch or bench at the base of the slope.

Cut slopes in unweathered hard rock shall be designed and constructed in accordance with Chapter 107 of the IDM. Developer shall construct a 20-foot minimum width rockfall catchment ditch or bench at the base of the slope. Alternatively, for permanent cut slopes in soft or hard rock, Developer shall prepare and submit for IFA's approval a site-specific rock cut slope design following the design requirements set forth in Attachment 13-2 (Site-Specific Design Requirements for Rock Cut Slopes) and shall implement appropriate inspection and maintenance protocols to ensure that rockfall hazards are effectively managed throughout the Term of the Agreement.

Where existing cut slopes in soft or hard rock are not required to be modified, other than to comply with the design requirements of this Section 13.3.2.7 for new rock cut, these existing rock cut slopes may be retained in the Final Design, provided that Developer implements

appropriate inspection and maintenance protocols to ensure that rockfall hazards are effectively managed throughout the Term of the Agreement.

Permanent cut slopes in excess of 30-feet in height shall include intermediate rock cut benches. The maximum vertical distance between two adjacent intermediate rock cut benches shall be 30-feet. Intermediate rock cut benches shall be at least 15-feet wide and shall be slightly sloped toward the rock face and parallel to the roadway to outfall at suitable drainage ditches.

13.3.2.8 Design of Noise Wall Foundations

Foundations for ground-mounted noise walls and noise walls mounted on retaining walls may be shallow or deep as appropriate for the soil conditions. Refer to Section 13.3.2.3 for the design requirements of deep foundations. Refer to Section 13.3.2.2 for the Design Requirements of shallow foundations.

13.3.2.9 Design of Foundations for Traffic and Intelligent Transportation System Structures

Refer to Section 13.3.2.3 and AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* for design requirements for deep foundations for sign structures, light poles, and all other ancillary intelligent transportation system (ITS) components, including but not limited to cameras, cabinets, and traffic poles. Refer to Section 13.3.2.2 for the Design Requirements for shallow foundations.

13.3.2.10 Design of Subgrade for Pavements

The top of subgrade shall be identified by Developer on the pavement details. Any material placed above the top of subgrade shall be considered part of the pavement structure. Any material placed below or other Work below top of subgrade shall be considered a subgrade improvement. Developer shall specify the design subgrade strength, Resilient Modulus (Mr) values), planned subgrade improvements, and as-needed subgrade improvements in the interim pavement report. The same design subgrade strength value shall be used throughout the entire area of each roadway element. In the case that a subgrade improvement is used throughout a significant portion of a roadway element, it shall be shown in the pavement details. When the native soils are not capable of providing the minimum design strength, a subgrade improvement strategy shall be included in the pavement design to reach the minimum strength requirement at the top of subgrade.

Subgrade improvements and testing shall be conducted in accordance with Standard Specifications Sections 207 and 215. Proofrolling records and field notes are required to confirm the minimum subgrade strength was achieved and shall be included in the final pavement report. In the case that the top of subgrade does not pass test rolling, Developer shall improve the failed area to a point that it meets or exceeds the proofrolling requirements. Additional proofrolling of the failed area shall be performed after improvement to verify the test rolling requirements have been met. Documentation shall be in accordance with Project Standards and a copy provided to IFA.

13.3.3 Interim Design Memoranda

Developer shall prepare an interim design memorandum for each individual Project element or group of Project elements that is consistent with the geotechnical planning reports. Interim

design memoranda shall be prepared and provided to IFA for approval with the Stage 1 Design review submission. Each interim design memorandum shall be submitted in accordance with the Project Standards and shall include the following, at a minimum:

1. Description of the Project elements included in the memorandum
2. Locations of borings, rock coring, geophysical testing, and other in-situ testing
3. Field testing procedures
4. Final typed boring logs updated with laboratory testing results
5. Electronic copy of the gINT data of subsurface investigation data
6. Results of any in-situ testing and geophysical testing
7. A description of subsurface conditions, including groundwater, and subsurface profiles
8. Results of laboratory tests
9. Values assigned to soil parameters for design
10. Descriptions of pertinent geotechnical analyses and designs
11. Conclusions and recommendations for the specific Project elements
12. Construction considerations such as blasting and vibration monitoring
13. Instrumentation and monitoring requirements

13.3.4 Final Geotechnical Reports

Developer shall prepare final geotechnical reports for individual Project elements or groups of Project elements, consistent with the geotechnical planning reports and the interim design memoranda, and submit to IFA for approval. At a minimum, the final geotechnical reports shall include the following:

1. The corresponding geotechnical planning report
2. The corresponding interim design memorandum
3. The locations and results of borings, rock coring, geophysical testing, and other in-situ testing
4. A detailed description of geological and subsurface conditions for each Project element (including a description of site stratigraphy)
5. Field investigation procedures
6. A description of groundwater conditions
7. Results of laboratory tests
8. Values assigned to all applicable soil parameters for design
9. All pertinent data and complete discussions of all geotechnical analyses and design

10. All relevant design calculations and computer program results, checked and initialed by a Registered Professional Engineer
11. Conclusions and recommendations for foundation types for structures, embankments, cut slopes, retaining walls, ground improvement, requirements for backfill materials
12. Groundwater problems encountered, means of dewatering, and, as applicable, other solutions
13. Designs for support of excavation
14. Results of instrumentation and monitoring and post-construction monitoring summaries
15. Potential settlement problems
16. Potential stability problems and analysis results
17. Seismic Zone Information

For each of the following Project elements, Developer shall submit the corresponding listed items with the final geotechnical reports:

1. Foundations
    a. Individual pile and pile group design calculations, including maximum factored axial and lateral resistances for the pile type, size, and length (including any effects of liquefaction and downdrag)
    b. Estimated pile and pile group settlement
    c. Shallow foundations calculations, including maximum factored bearing resistance, estimated differential and total settlements, and rotations
    d. Calculations of embankment settlement (magnitude and time rate) and downdrag forces on the piles, depths to zero or negligible settlement, and the proposed means to mitigate the downdrag
2. Retaining Walls
    a. Wall design calculations, including the results of the global and internal stability analyses and analyses of total, differential, and secondary settlements
    b. Calculations for analyses of sliding, overturning, eccentricity, and bearing pressure for live and seismic loadings
3. Embankments
    a. The results of the slope stability analyses, including external loading from live and seismic loading, the recommended side slopes of all embankments
    b. The results of settlement analyses, including predictions of the magnitude and duration of primary, secondary, and post-construction settlements
    c. The results of the liquefaction analyses and the proposed methods of mitigation for any location deemed necessary to protect the integrity of bridges and adjacent walls

d. The proposed methods of protecting and abandoning utilities

e. Details of staged construction design

4. Cut Slopes

a. The results of the slope stability analyses, including external loading from live and seismic loading

b. The recommended side-slopes of all cuts

13.4 Construction Requirements

Developer shall be responsible for all damage (including but not limited to settlement and vibrations) to properties, structures, or Utilities, both inside and outside of the Project ROW, caused by the Work on the Project, and shall appropriately mitigate for these damages, and repair any damage caused by, arising out of, or related to Developer's Work.

13.4.1 Temporary Support of Excavation

Temporary support of excavation shall be designed in accordance with all applicable OSHA standards and AASHTO requirements. Detailed design of all components shall be completed by Developer.

13.4.2 Utilities

Developer shall identify all new and existing Utilities crossing through or beneath embankments, evaluate settlement impacts on these Utilities, and evaluate the impacts of abandoned Utilities on settlements.

13.4.3 Blasting Requirements

Blasting for rock excavation shall satisfy the requirements of Attachment 13-1 (Blasting Operations).

In addition to the requirements of the Project Standards, Developer shall submit a blasting plan to the IFA, for review and comment, and the Indiana Fire Marshal. The Indiana Fire Marshal is empowered to regulate the character and strength of explosives used, and the manner of their use and storage. The handling and storage of explosives shall be in accordance with Federal Regulation 18 U.S.C., Section 1102, Chapter 40, sections 841 to 848.

The location of magazines for the storage of explosives and for the separate storage of detonators shall be included in the blasting plan. Explosives shall be kept under lock, with the key only to be kept in the hands of a licensed blaster. In no case shall caps or other detonators be stored or transported with dynamite or other explosives. Developer shall make a weekly audit of blasting material, and it shall be reconciled with blasting materials actually used at the Site. Developer shall notify the IFA immediately of any missing blasting material.

Blasts shall be carefully confined and adequately covered to prevent injury to persons and to protect adjacent structures, Utilities, and property against damage. Disturbance to local residents due to blasting operations shall be in accordance with state and local laws and ordinances. See Section 7.8 for additional requirements.

Before initiating each blast, ample warning shall be given to allow all persons to reach positions of safety. Developer shall complete, maintain, and submit permanent blast reports to IFA weekly during blasting, including logs of each blast. Logs shall be available for review and verification by IFA and authorized personnel at all times.

13.4.4 Construction of Bridge and Retaining Wall Foundations

Ground consolidation, existing structure settlements, and disturbance to local residents due to the installation of foundations shall be maintained within limits required by applicable Laws.

13.4.4.1 Shallow Foundations

After excavation, Developer's geotechnical engineer shall verify that the exposed subgrade is suitable for the calculated pressures exerted by the proposed abutment or fill-type retaining wall.

13.4.4.2 Deep Foundation Testing and Monitoring

Field testing shall be performed for deep foundations to evaluate foundation capacity and integrity, to verify design assumptions, to determine foundation installation characteristics, to evaluate the pile-driving system performance, and to establish foundation depths. The deep foundation testing and monitoring shall include all necessary quality control testing, test piles or shafts, dynamic testing, static load testing, statnamic testing, and non-destructive integrity testing as appropriate for the foundation type.

Developer shall submit to IFA for review and comment the results of the WEAP analysis on the hammer-pile-soil systems to be used on the Project. The WEAP analysis shall be performed for all hammers proposed for use and for each Project element with driven pile foundations.

A PDA shall be used to determine if each hammer is delivering the energy required by the WEAP analysis. Each hammer used to drive test piles and production piles shall deliver a minimum of 45 percent of the rated hammer energy. Foundation testing and monitoring shall be performed on both the testing and production deep foundations, and shall be located so that they will address all conditions of foundation type, capacity, and soil conditions encountered. All PDA equipment, testing, recording, and reporting shall be performed in accordance with ASTM D-4945 Standard Test Method for High Strain Dynamic Testing of Piles. The PDA Operator shall be a Registered Professional Engineer and shall have achieved advanced level certification within the last three years through "Dynamic Measurement and Analyses Proficiency Test" conducted by Pile Dynamics, Inc., and the Pile Driving Contractors Association. The Case Pile Wave Analysis Program shall be utilized to determine the as-built pile capacity from the PDA data. As a minimum, the first pile driven for each substructure unit shall be a PDA test pile.

At least 30 days before constructing deep foundations, Developer shall prepare and submit to IFA a detailed description of the proposed deep foundation testing and monitoring programs for review and comment. The description shall include detailed specifications and plans presenting the foundation type, test type, purpose, number, location, and procedures for each test, and the recording and reporting procedures. The testing and monitoring of deep foundations shall be in accordance with the applicable ASTM and AASHTO specifications.

Static load tests performed on piles or drilled shafts shall be in accordance with ASTM D-1143. Developer may also submit to IFA for its review the use of either the Osterberg Load Cell or the

statnamic testing arrangement. Load tests shall be performed at locations representative of the different subsurface conditions, foundation types, foundation capacities, and foundation depths. Developer shall submit to IFA, for review and comment, the proposed configuration for pile load tests including the structural calculations for the reaction beam, piles, and connections; calibration results for the loading jack, load cell, and gauges before the tests; and other pertinent details.

All foundation field-testing results shall be compared with the design resistance and proposed resistance factors. Where field-testing results reflect a lower-than-required factored resistance, Developer shall prepare a remedial action plan to be submitted with Released-for-Construction Design Documents for Design Review.

13.4.4.3 Drilled Shaft Inspection and Integrity Testing

Developer shall assign one full-time inspector for each drilled shaft installation rig in use for bridges, retaining walls, and other critical structures. Developer shall submit the qualifications for each proposed drilled shaft inspector who meets one of the following minimum requirements to IFA for approval:

1. At least one year of drilled shaft installation experience working under the supervision of a Registered Professional Engineer specializing in foundations and geotechnical engineering.
2. At least two months of inspection experience and attendance at the FHWA-NHI Drilled Shaft Foundation Inspection Course (#132070).

Integrity testing consisting of ASTM D-6760 Crosshole Sonic Logging or ASTM D-5882 Low Strain Pulse Echo Methods shall be performed on 100 percent of drilled shaft bridge foundations. Testing shall be in accordance with INDOT Recurring Special Provision 728-B-203.

Based upon the installation and testing data, Developer's geotechnical engineer shall validate that the drilled shafts were adequately constructed. If not adequately constructed, Developer's Responsible Engineer shall recommend an appropriate resolution for review and comment by IFA.

13.4.4.4 Pile Driving Records

Developer shall create and maintain a written record of pile driving. For the entire length of each pile, Developer shall record blows and estimated delivered energy (hydraulic hammers) or stroke (diesel hammers) for each foot of penetration. Developer shall record the start and stop times to the nearest minute and record any stoppages in field pile driving.

Prior to beginning the placement of reinforcing steel around the piles, and, as applicable, prior to beginning any backfilling around the piles, Developer shall present to IFA the complete driving records, including tolerance measurements for all piles in each pile group and the PDA and Case Pile Wave Analysis Program results.

13.4.4.5 Developer's Pile Inspector and Geotechnical Engineer

Developer shall assign one inspector for each pile driving rig in use. Developer shall submit to IFA for approval qualifications for each pile driving inspector who meets one of the following minimum requirements:

1. At least one year of pile driving inspection experience while working under the supervision of a Registered Professional Engineer specializing in foundations and geotechnical engineering.

2. At least two months of pile driving inspection experience and successful completion of FHWA-NHI Driven Pile Foundation Inspection course (#132069).

The geotechnical engineer shall either be on-Site during the driving of the first pile at each support (monitored with PDA) and until sufficient data is gathered to establish appropriate driving criteria for each support, or be in direct telephone contact with the PDA operator and the inspector observing the pile driving. The geotechnical engineer shall be notified immediately if any unusual or otherwise unanticipated pile driving conditions are encountered, including if the piles are driven out of the tolerances specified in the Project Standards.

Based upon the installation and testing data, Developer's geotechnical engineer shall validate that the piles were adequately driven. If not adequately driven, Developer's Responsible Engineer shall recommend an appropriate resolution for review and comment by IFA.

13.4.5 Mechanically Stabilized Earth Retaining Wall Construction

MSE retaining walls shall be designed and constructed in accordance with INDOT Standard Specifications Section 731 – Mechanically Stabilized Earth Retaining Walls, and FHWA *Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes*.

13.4.6 Fill Embankment Construction

Fill embankments shall be constructed in accordance with the INDOT Standard Specifications.

Developer shall submit to IFA the source and material properties of all fills proposed for use, including the results of gradation tests and plasticity tests. All laboratory tests shall be performed in accordance with the appropriate ASTM/AASHTO test methods. The bearing capacity of the embankment subgrade shall be validated by Developer's geotechnical engineer prior to initiating construction. Sheet flow across the slope face shall not be permitted during construction or for the permanent condition until vegetation is established on the face of the slopes.

13.4.6.1 Settlement of Embankments

Prior to proceeding with subsequent construction activities, Developer shall compile and submit to IFA all settlement data, including analyses demonstrating that settlements have dissipated to the extent required by subsequently constructed facilities.

13.4.6.2 Embankment Construction near Existing Structures

Where embankments or walls are to be constructed in the vicinity of existing structures, Developer shall develop and implement a program for performing preconstruction surveys and monitoring the movement of structures that shall include the following:

1. Estimate the settlement influence zone from embankment and construction loads that includes settlements in excess of 0.50 inch.

2. Site reconnaissance to determine the sensitivities of adjacent structures to settlement.

3. Identification of Site-specific facilities that may be adversely affected by settlement.
4. Procedures to mitigate and to compensate property owners affected by settlement/movement resulting from construction activities.

13.4.7 Construction of Top-Down Walls (Cut Walls)

Top-down walls (cut walls) shall be designed and constructed in accordance with Standard Specifications Section 734 – Permanent Earth Retention System for Cut-Wall Application.

13.4.8 Culvert Construction

Refer to and Section 8 (Drainage) and Section 13.4.2, with the exception that culverts may be constructed and remain within the pavement section of the highway.

13.4.9 Construction of Noise Wall Foundations

Refer to Section 13.4.4.

13.4.10 Construction of Foundations for Sign Structures

Refer to Section 13.4.4.

13.4.11 Construction of Pavement Subgrades

Developer shall be responsible for construction of a suitable and stable subgrade on which to place the pavement section. The top of subgrade shall be proof-rolled prior to placing the base course in the pavement sections. Any movement in the top of subgrade during test-rolling shall be an indication of unstable subgrade or the presence of unsuitable material. Unstable or unsuitable areas shall be treated as recommended in the final geotechnical report. After treatment, the area shall again be test-rolled. Any area still showing movement shall receive additional corrective treatment.

13.4.12 Geotechnical Monitoring and Instrumentation

Developer shall conduct pre-construction and post-construction surveys conforming to industry standards for existing structures and other property, temporary construction support structures, and new permanent structures and other new property, within 500 feet of Developer's construction activities that may cause ground vibrations, including blasting, pile driving, and moving construction equipment. The pre-construction and post-construction surveys shall include a detailed photographic log (photographs with descriptions) of the exterior of all structures surveyed. Pre-construction and post-construction surveys shall be submitted to IFA.

Records of structures or other property, where available, shall be examined during the design stage. Where no records exist, assessments shall be made by Developer and clearly documented. These assessments shall be subject to verification at the commencement of the construction phase prior to the adjacent construction activity.

Developer shall prepare a Vibration Monitoring Plan, to monitor existing structures or other property, temporary construction support structures, and in-progress construction of permanent structures or other property for effects of construction activities, such as excavation by blasting, pile driving, and nearby construction equipment traffic, and submit to IFA for review and

comment. Monitoring shall include vibrations, ground accelerations, tilt or rotation, vertical and lateral movement, and changes in groundwater, during and after construction. The results of vibration measurements shall be used to develop attenuation curves for predicting vibrations at varying distances from the source.

The Vibration Monitoring Plan shall provide that potentially affected structures or other property are protected against damage due to the Work. Limiting values of movement (horizontal and vertical), vibration, acceleration, and other critical parameters shall be established by Developer for each facility within the zone of influence of the Work. The Vibration Monitoring Plan shall include response plans that shall be implemented when threshold parameters are exceeded.

Developer shall make its own determination about the allowable peak particle velocity (PPV) threshold values for fragile and extremely fragile historical structures, however the PPV threshold shall not exceed the values as specified in Table 13-2.

Table 13–2: Maximum Peak Particle Velocity

Structure Classification	Maximum PPV (inches per second)
Residential	0.50
Fragile	0.20
Extremely Fragile	0.12
Other	2.00

See Section 7.8 (Blasting Operations and Construction Vibration) for additional requirements.

Developer shall obtain written consent from owners of privately owned property prior to accessing the property to perform surveys, vibration monitoring, repairs or other related activities.

Developer shall prepare an instrumentation report for review and comment detailing their program of instrumentation and monitoring. Instrumentation shall provide construction-related control information and accommodate the collection of long-term performance data. Developer shall be responsible for procuring, installing, recording, interpreting data, maintaining, and protecting instrumentation. Monitoring shall be initiated in advance of construction in sufficient time to allow for the establishment of baseline readings for all instruments. Instruments that fail or are damaged shall be restored or replaced by Developer and Work shall cease in the areas monitored until the instruments are satisfactorily restored or replaced.

Instrumentation shall include appropriate types and quantities of monitoring instruments capable of measuring horizontal and vertical movements, tilt/rotation of structural elements, soil pore pressures, and vibrations, as applicable. Instrumentation that may be used in monitoring programs to control and assist design and construction include but are not limited to the following:

1. Piezometers and observation wells
2. Inclinometers
3. Survey stations on structures and at ground-level locations

4. Tiltmeters
5. Deep and shallow settlement points and extensometers
6. Strain and load-measuring devices
7. Seismographs

Construction instrumentation monitoring reports shall be submitted to IFA for approval. Instrumented Work shall not be released for subsequent construction until complete monitoring reports have been approved by IFA. Corrective actions shall be taken where the instrumentation data so warrants.

14 STRUCTURES

14.1 Standards and References

Design and construct the structures Work in accordance with the applicable requirements of the PPA Documents, including Project Standards and this Section 14; Governmental Approvals; and applicable Laws.

14.2 Bridge Requirements

14.2.1 Location and Geometry

New bridges and bridge rehabilitations necessary to construct the Project shall be designed and constructed by Developer. At a minimum, existing bridges shall be widened where necessary to achieve the specified clear roadway width.

Developer shall design and construct sidewalks or multi-use paths on bridges to the geometrics as shown in Table 14-1.

Table 14–1: Minimum Sidewalk or Multi-Use Path Widths on Bridges

File Structure No.	Location	Sidewalks & Multi-Use Path Minimum Widths (feet)
TBD	Rockport Road over I-69	6.0 north side 6.0 south side
TBD	Fullerton Pike over I-69	11.0 north side 6.0 south side
TBD	Tapp Road over I-69	11.0 north side 6.0 south side
TBD	Vernal Pike over I-69	9.0 north side 6.0 south side
45-53-7257A	SR 45 / 2nd Street over I-69	11.0 north side 6.0 south side
48-53-7323A	SR 48 / 3rd Street over I-69	11.0 north side 11.0 south side

Developer shall design and construct lanes, shoulders, and bridge railing offsets in accordance with the criteria as set forth in Section 9 (Roadways) and in accordance with the applicable 3R or 4R design criteria in IDM Chapters 53, 55, and 402, except as noted herein. Developer shall design and construct 12 feet minimum shoulders right of the travel way for all Mainline I-69 bridges, with the exception of I-69 NB over Jordan Creek. Developer shall provide flush or raised medians on bridges as specified in Section 9.

File Structure Numbers for new bridges will be assigned by IFA.

Existing bridges replaced by new bridges shall be removed by Developer.

Minimum vertical clearance shall be 16.0 feet at File Structure Nos. 37-53-2462 (Indiana Railroad over I-69), (37)46-53-5766B (Arlington Avenue over I-69), and 37-53-5986 (Walnut Street SB Ramp over I-69). At all other locations, minimum vertical clearance shall be as shown in Table 14-2.

Table 14–2: Minimum Vertical Clearance

Functional Classification Under	Minimum Vertical Clearance (feet)
Freeway	16.5
Arterial	16.5
Collector	14.5
Local	14.5
Railroad	existing clearance

For waterway crossings, all new bridges and bridge rehabilitations shall satisfy minimum waterway opening requirements. Developer shall perform hydraulic and scour analyses consistent with the Final Design. Refer to Section 8 (Drainage) for hydraulic and drainage requirements.

The minimum low structure elevation for new waterway crossings shall be the Q_{100} elevation plus the minimum required freeboard of 2 feet. Bridge rehabilitations, including widenings of waterway crossings, shall not decrease the existing freeboard.

Full-width reinforced concrete bridge approach slabs shall be constructed for all new bridges and bridge rehabilitations, with the exception of File Structure No. 48-53-7323 (SR 48 / 3rd Street over I-69). Approach slabs shall not be placed concurrently with the bridge deck.

14.2.2 Loading

New bridges shall be designed for HL-93 live loading in accordance with the AASHTO *LRFD Bridge Design Specifications*. Bridge rehabilitations shall be designed for HS-20 live loading in accordance with the AASHTO *Standard Specifications for Highway Bridges*.

Bridges shall be designed for actual dead loads and an additional design load for a future-wearing surface at 35 pounds per square foot. The weight of all falsework and stay-in-place forms shall be accounted for in the design. The distribution of all composite dead loads on new bridges shall be in accordance with the applicable Project Standards. The distribution of all composite dead loads on bridge rehabilitations shall be in accordance with the AASHTO *Standard Specifications for Highway Bridges*.

Seismic design of bridges shall be based on the soil profile type. All bridges shall be classified as essential bridges in accordance with Article 3.10.5 of the AASHTO LRFD Bridge Design *Specifications*.

Construction loading shall be accounted for in accordance with the IDM.

14.2.3 Foundations

Bridge foundations shall conform to the provisions of Section 13 (Geotechnical) in addition to the requirements listed in the other sections of the Project.

Foundations and structures shall be designed and constructed to meet the following criteria:

1. Post-construction settlement of bridge piers and abutments shall be less than 1 inch total settlement and less than 0.5 inches differential within an individual substructure unit or between adjacent substructure units.
2. Lateral deflection at top of foundations for non-seismic loading shall be as required for serviceability of Developer's design, but shall not exceed 1 inch.

14.2.4 Substructure

Railway crash walls shall satisfy geometric requirements and shall be designed and constructed in accordance with the strictest requirements of the railroad, the IDM, AASHTO *LRFD Bridge Design Specifications*, and AREMA *Specifications*.

Developer shall use wall piers or multi-column piers with debris walls at water crossings in accordance with the IDM.

Permanent substructure components shall be designed as concrete members.

For bridge rehabilitations, Developer shall remove and patch all unsound concrete at interior bents and piers in accordance with rehabilitation technique SF-1 in IDM Chapter 72. In addition to the requirements of INDOT Standard Specifications Section 710, Developer may use a fiber wrap concrete casing system for the rehabilitation of existing concrete pier or intermediate bent columns in accordance with Attachment 14-1 (Fiber Wrap Concrete Casing System Provisions). Developer shall be responsible for determining all quantities of concrete removal and patching.

Developer shall convert all end bents to semi-integral for bridge rehabilitations consisting of either deck replacement or deck overlay.

Developer shall replace and add riprap for all water crossings in accordance with the limits shown in IDM Figures 17-5I and 17-5J. Riprap size shall be determined in accordance with IDM Figure 203-2D. Developer shall reconstruct berms in accordance with IDM Chapter 402-6.02(02) and Figure 402-6K. Channel clearing shall be restricted in accordance with IDM Chapter 203-3.03(01).

For bridge rehabilitation work on File Structure No. 37-53-2441A (I-69 over CSX Railroad), Developer shall perform the following Work, at a minimum:

1. Extend the crash walls at the interior bents as necessary to provide a 10-foot height above the top of high rail elevation and 2.5-foot thickness.
2. Replace the existing concrete berms with Special Type A paved side ditches and Type D inlets to accommodate slope for new deck drains.

14.2.5 Superstructure

Bridges shall be composite and continuous over interior supports. Integral or semi-integral end bents shall be used wherever eligible, per the IDM.

Superstructure types shall be limited to those specified in IDM Chapter 402-8.02. Side-by-side box beams, voided slabs, intermediate hinges, and fracture-critical members are prohibited.

Bridges shall have a minimum of four beam lines under permanent conditions. Bridges shall have a minimum of three beam lines when supporting traffic during temporary conditions resulting from staged construction.

Steel bridges shall use painted or weathering steel. For weathering steel bridges, details shall be provided to minimize staining of MSE walls, abutments, and, as applicable, piers. At a minimum, details shall include drip bars on bottom flanges and painting of the girders in accordance with the IDM and INDOT Standard Specifications.

For bridge rehabilitations, existing beams shall not be overstressed by more than 5 percent.

For bridge rehabilitations, cover plate and diaphragm fatigue details shall be retrofit to result in a fatigue resistance detail exceeding Category C.

New bridge decks shall be 8 inches thick, minimum Class C cast-in-place concrete with epoxy-coated reinforcing bars. Partial depth and full depth precast deck panels are prohibited.

For bridge deck replacements, all non-composite steel beams shall be made composite.

For bridge deck replacements on existing beams, Developer shall achieve the proper road grade, cross slopes, and clear roadway width for all remaining beams through the use of fillets, shear stud connectors, or reinforcing bars. Developer shall not use a fillet shallower than that required in accordance with IDM Chapter 404-2.02.

For bridge deck overlays, Developer shall perform the following Work to existing bridge decks:

1. For bridges with an existing overlay, replace in accordance with Attachment 14-3 (Existing Overlay Removal, Hydrodemolition, and Latex Modified Concrete Replacement Overlay for Bridge Deck Provisions).
2. For bridges without an existing overlay, remove and patch all unsound concrete in accordance with rehabilitation technique BD-1 in IDM Chapter 72 prior to placing overlay material. Developer shall determine all quantities of concrete removal and patching.
3. Remove and replace the last 5 feet, at a minimum, at each end prior to placing the overlay.

Concrete bridge railing shall be used on all bridge structures. Concrete bridge railing shall be at least TL-5 for bridge structures carrying I-69. Concrete bridge railing shall be at least TL-4 for all other bridge structures. Barrier warrants shall satisfy IDM Chapter 49.

All bearings replaced shall be replaced with elastomeric pads.

Developer shall design drainage features to eliminate or minimize the need for bridge deck drains. Wherever possible, bridge drainage shall be directed to riprap drainage turnouts located

beyond an approach concrete bridge railing transition and outside of any MSE wall backfill. Open bridge deck drains shall be no closer than 10 feet from the face of a substructure element.

Expansion joints shall be either strip seal type SS or modular type M, except that an expansion joint sealing system may be used on bridge rehabilitations. The use of BS joints is prohibited.

14.2.6 Materials

Reinforcing bars meeting the mechanical properties of ASTM A1035 Grade 100 or ASTM A615 Grade 75 are permitted. Maximum reinforcing bar spacing shall be in accordance to the Project Standards.

The use of timber for permanent bridge structural components is prohibited.

The use of self-consolidating, lightweight, semi-lightweight, high-strength, and high-performance concrete for permanent bridge structural components is prohibited.

Concrete elements over 60 inches thick shall be defined as mass concrete and shall be constructed in accordance with Attachment 14-2 (Structural Mass Pour Concrete Provisions). Concrete for drilled shafts shall not be considered mass concrete.

14.2.7 Surface Seal

For new bridges and bridge rehabilitation, surface seal shall be applied to the top of decks and approach slabs, all exposed surfaces of concrete railings and railing transitions, and all exposed surfaces of the substructures. Surface seal shall be applied to deck copings in accordance with IDM Figure 17-5A(0). For concrete superstructure structural members, the tops and the outside faces of fascia members shall be surface sealed. The superstructure shall be sealed prior to opening the structure to traffic. Surface seal shall not be applied to an overlay or to the top of bridge deck prior to the placement of an overlay.

14.2.8 Load Rating

Developer shall provide a LFR load rating for all rehabilitated bridges and a LRFR load rating for all new bridges in accordance with the AASHTO *Manual for Bridge Evaluation*. The ratings shall be based on the final Record Drawings of the structures. Developer shall submit the load rating calculations and NBIS forms to the IFA for review and comment with the Record Drawings.

14.3 Retaining Wall Requirements

Retaining wall types shall be limited to those specified in IDM Figures 410-2A and 410-2B. Retaining wall types shall not include modular block, bin walls, gabion walls, or prefabricated modular walls unless stipulated otherwise herein. Extensible ground reinforcement shall not be used. Wall types shall be included in Design Review submittals submitted to IFA for its review and comment. Modular block walls will be allowed if they are less than 10 feet tall, are reinforced, and are not in a floodplain.

MSE walls shall be in accordance with INDOT Standard Specifications Section 731. Other retaining wall types shall be in accordance with the construction tolerances defined in the MSE retaining wall Standard Specification. Material specifications for wall types other than MSE walls

shall be in accordance with the Project Standards and applicable minimum service life of 75 years, or 100 years if part of a bridge abutment.

The use of timber for permanent retaining wall structural components is prohibited.

Differential settlement shall not exceed the values shown in IDM Figure 410-2A.

Where exposed heights of retaining walls present grade differences of greater than 2 feet, appropriate fall hazard protection in the form of fence consistent with Developer's Aesthetics and Enhancement Implementation Plan shall be installed on retaining wall structures.

When roadway embankment is supported by retaining wall, Developer shall provide for roadside safety in accordance with IDM Chapter 49 and the applicable INDOT Standard Drawings.

14.4 Noise Wall Requirements

The provisions of INDOT Recurring Special Provision 620-R-483 and AASHTO *Guide Specifications for Structural Design of Sound Barriers*, whichever provides the more strict criteria, shall be used for the design.

Wind velocity of 90 miles per hour shall be used for design.

Noise barriers shall be considered roadside hazards and may be located adjacent to the roadway shoulders, the top of cut slopes, on top of or immediately behind retaining walls, and on bridges.

Noise wall structure designs shall be prepared and provided to IFA for Design Review. Developer shall obtain IFA approval of all designs prior to construction.

14.5 Anti-Graffiti Coating

Anti-graffiti coating shall be placed on all exposed surfaces of walls and bridges. Anti-graffiti coating shall be placed from the finished ground surface at the base of the wall or substructures to a height of 10 feet above the finished ground surface.

The anti-graffiti coating shall be a sacrificial, wax-based, emulsion-type coating.

Prior to application, Developer shall inspect all surfaces to be treated and correct all flaws in the substrate that would ultimately affect the performance or appearance of the anti-graffiti coating.

Surface preparation, method of application, application techniques, coating thickness time of application, rate of application, temperature requirements for application, and curing time for the anti-graffiti coating shall be in accordance with the written requirements of the manufacturer.

Developer shall allow substrate to fully cure and newly coated surface to fully cure before application. Application shall be performed by an experienced applicator in accordance with the manufacturer's recommendations. The number of coats and coverage rates shall at no time be less than the manufacturer's written requirements.

Developer shall protect plants and vegetation from over-spray and adjoining surfaces that are not to have the anti-graffiti coating applied. Developer shall protect the public in accordance with all federal, State, and local environmental restrictions.

Developer shall apply surface seal prior to applying the anti-graffiti coating.

14.6 Traffic Structure Requirements

The minimum design life for the traffic structures covered herein shall be 50 years. Refer to Section 13 (Geotechnical) for foundation design for traffic structures and Section 11 (Traffic) for design and construction requirements.

Bridge-mounted traffic structures are prohibited.

14.7 Sign Structure Requirements

Standard sign structures shall be in accordance with the INDOT Standard Drawings.

Non-standard sign structures shall comply with AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*. Developer shall apply 50-year recurrence interval for wind speed and other adjustment factors in accordance with AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals* for non-standard sign structures.

Developer shall apply sign data (e.g., material, weight, and dimensions) from sign manufacturers approved by the Department to perform sign structure calculations, and shall submit calculations to IFA for approval.

Developer shall evaluate existing sign supports for structural adequacy for all modifications. Where new sign panels are proposed by Developer on existing structures, Developer shall prepare and provide calculations demonstrating that the existing structure can accommodate the proposed sign panels to IFA for approval. If an existing sign structure cannot accommodate the proposed sign panels, Developer shall provide a new sign structure.

Bridge-mounted sign structures are prohibited.

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15 UTILITY AND RAILROAD

This Section 15 provides information on the Developer's responsibilities as they relate to existing and, as applicable, new Utilities or Utility services; the manner in which Utilities are to be Adjusted; and who shall be responsible for the Work. Developer shall be responsible for providing for construction and connection of new Utility services as applicable for signs, lighting, signals, and other new Utility services required for the Project. This Section 15 also provides information on the Developer's responsibilities as they relate to coordination with railroads that may be impacted by the Project.

15.1 General Utility Requirements

Potential Utility conflicts associated with the Reference Design have been identified and brought to the attention of Utility Owners. The Developer is responsible for identifying and resolving all Utility conflicts resulting from the Project design and construction. Existing Utility Information, as is known, is included in the RID. See Section 5.5.10 of the PPA for additional information regarding Developer's use of Utility Information and Reference Information Documents.

In considering the locations and the potential impacts to Utilities on the Project, the Developer shall identify and resolve Utility conflicts in the following order of precedence:

1. Avoid the conflict
2. Minimize the conflict by modifying the design
3. Adjust the Utility

The Adjustment of a Utility may be necessary to accommodate the Project for either one or both of the following reasons: (a) a physical conflict between the Utility and the Project, including its construction, operation, maintenance, or use; and, as applicable, (b) an incompatibility between the Project as designed and the Utility based on the requirements of the applicable Adjustment Standards and applicable Laws. The limits of Adjustment of existing Utilities shall extend as far as is necessary to accommodate or permit construction of the Project, whether inside or outside of the Project ROW. The Developer shall ensure that Utility replacements are capable of providing service at least equal to that offered by the Utilities existing as of the Proposal Due Date, unless the Utility Owner has specified a lesser replacement.

The Developer shall abide by and fulfil the requirements related to Utilities and Utility Adjustments as described in this Section 15, and any other Utility-related obligations of Developer set forth in the PPA Documents and shall follow the Department's 105 IAC 13 *Utility Facility Relocations On Construction Contracts* and relevant Project Standards in Section 21.

The Developer shall be responsible for all reimbursement of costs to Utility Owners, based on applicable Standards and Laws, and shall be responsible for reimbursing all costs that Utility Owners incur in Adjusting their facilities, as applicable, to accommodate the Work.

15.1.1 Utility Owners

Several Utility Owners have been identified within the proposed Project ROW. A list of all known Utility Owners, along with contact information is provided in the RID.

15.1.2 Utility Adjustment Types

Three Utility Adjustment types may apply to the Project. Developer shall comply with the following requirements associated with each Utility Adjustment Type as indicated in the RID UT 15.2 (Existing Utility Matrix):

Type 1 Utility Adjustments – The Utility Owner performs design and construction of the Utility Adjustment and is reimbursed by IFA. A Developer Utility Agreement is not required for these Adjustments. Final Design Documents prepared by the Developer for the Project shall accommodate Utility Adjustments performed as Type 1 Utility Adjustments.

Type 2 Utility Adjustments – The Developer shall coordinate the Final Design with the Utility Owner and negotiate a Developer Utility Agreement. The Utility Owner or the Developer will perform the final Utility Adjustment design. The Developer shall perform the Utility Adjustment Work in accordance with the Developer Utility Agreement. Developer shall perform the Utility Adjustment Work using a Contractor acceptable to the Utility Owner. Developer shall be responsible for the cost of Utility Adjustment design and Construction Work. The Developer Utility Agreement shall include specifics of the Type 2 Utility Adjustments, including design and construction requirements, Utility Adjustment Plan review and construction inspection, details of Developer's obligations to reimburse the Utility Owner for costs associated with any additional easements or other property interests, and any Betterments or Enhancements. For Betterments, the Developer shall seek reimbursement from the Utility Owner in accordance with Section 5.5 of the PPA.

Type 3 Utility Adjustments – The Developer shall coordinate the Final Design with the Utility Owner and negotiate a Developer Utility Agreement. The Utility Owner will perform the final Utility Adjustment design and Utility Adjustment Work in accordance with the Developer Utility Agreement. Developer shall be responsible for the cost of Utility Adjustment design and Construction Work. The Developer Utility Agreement shall include specifics of the Type 3 Utility Adjustments, including design and construction requirements, Utility Adjustment plan review and construction inspection, details of Developer's obligations to reimburse the Utility Owner for costs associated with any additional easements, and any Betterments or Enhancements. For Betterments, the Developer shall seek reimbursement from the Utility in accordance with Section 5.5 of the PPA.

15.1.3 Utility Design and Construction Constraints

New Utilities shall not be placed within nor shall existing Utilities remain within the pavement section of highways.

All Utility Adjustments, Utility Enhancements, and newly installed Utilities for the Project, whether they are designed or constructed by the Developer or the Utility Owner, shall be placed in accordance with the applicable Utility Owner Adjustment Standards, IFA utility regulations, policies, and procedures, INDOT *Utility Accommodation Policy,* and the terms and conditions of applicable encroachment permits. See Section 5.5 of the PPA for additional provisions governing Utility Adjustment Work.

For each Utility Adjustment, Utility Enhancement, or new installation, the Developer, in coordination with the Utility Owner, shall be responsible for verifying that the Utility, as designed and constructed, is compatible with and interfaces properly with the Project Final Design.

15.1.4 Standard of Care Applicable to Utility Work

The Developer shall contact Indiana811 at 1-800-382-5544 prior to commencing any Construction Work. The Developer shall request mark-outs for Utilities whose owners are not members of the locate systems. The Developer shall also coordinate with the Department, as the Department will mark Department-owned lighting, signal, and ITS Utilities. The Developer shall carry out the Work carefully and skilfully. The Developer shall support and secure Utilities so as to avoid damage and keep them satisfactorily maintained and functional. The Developer shall not move or remove any Utility without the Utility Owner's written consent, unless otherwise directed by IFA. At the completion of the Construction Work, the condition of all Utilities shall be safe and permanent.

If any Utilities are damaged by Developer's Work, the Developer shall notify the affected Utility Owner. The Utility Owner may cause the damage to be repaired at the Developer's expense. All repairs by Developer shall be performed in accordance with Good Industry Practice.

The Developer shall include provisions for its obligations with respect to Utilities in its Quality Management Plan.

15.1.5 Utility Agreements and Permits

Except as otherwise provided in Section 15.1.2, the Developer shall be responsible for preparing a Developer Utility Agreement with each of the Utility Owners. The Developer shall submit the Developer Utility Agreement to IFA for review and comment. The Developer shall submit Utility Adjustment Plans to IFA for transmittal to INDOT for review and comment and issuance of a Utility permit. The permitting agency will review the Developer Utility Agreement and Utility Adjustment Plans for completeness and compliance with encroachment policies and provide a response within ten (10) Business Days. The response could require changes to the Utility Adjustment Plan to comply with encroachment polices.

Utility Adjustments on county or city roads may require a permit from the jurisdictional local public agency. The Developer is responsible to obtain, or ensure the Utility has obtained, the required permits before the Adjustment construction begins.

Any water or sewer Utility Adjustments may also require permits from the Indiana Department of Environmental Management (IDEM). If the Developer is responsible for the Adjustment of a water or sewer Utility, the Developer shall obtain the required Governmental Approvals.

15.1.6 Additional Easements

Utility Owners are responsible for acquiring Utility easements and for following the environmental process; including adhering to the environmental commitments of the Project, obtaining categorical exclusions, and executing potential mitigation requirements associated with Utility easements and Adjustments. The Developer is responsible for coordinating environmental commitment requirements with the Utility Owners.

All costs, time and coordination of effort associated with acquiring Utility easements for Type 2 and Type 3 Utility Adjustments shall be reimbursable by the Developer.

15.1.7 Instructions and Authorizations

The Developer shall obtain authorization from the Utility Owner for any design or construction the Developer performs on behalf of the Utility Owner. The Developer shall verify that instructions and authorizations are consistent and compatible with the Developer's Final Design.

15.1.8 Utility Owner's Right to Inspect

The Utility Owner has the right to inspect the Work that is to be performed by the Developer on the Utility Owner's facilities. The notification requirements shall be included in the Developer Utility Agreement. All costs, time and coordination of effort associated with construction inspection necessary for Type 2 and Type 3 Utility Adjustments shall be reimbursable by the Developer.

15.1.9 Utility Enhancements

Some Utility Owners may request Betterments and other Utility Enhancements as a result of the required Adjustments of the Utility. Any such Utility Enhancements shall be governed by and comply with Sections 5.5.6 and 5.5.8 of the PPA.

The Developer shall keep IFA informed as to the status of requests for and negotiations with Utility Owners concerning Utility Enhancements.

15.1.10 Inactive Utilities

Unless specifically noted otherwise in the PPA Documents or Utility Agreements, the Developer shall remove or abandon inactive Utilities within the Project ROW. Inactive Utilities within the pavement section of highways shall be removed. Inactive Utilities below the pavement section of highways shall be removed or abandoned as indicated in Table 15-1.

Table 15-1 Treatment of Inactive Utilities Below Pavement Sections

Depth Below Subbase	Utility Diameter	Method of Abandonment
0 feet to 3 feet	All	Remove
3 feet to 15 feet	< 8 inches	Plug ends
3 feet to 15 feet	>= 8 inches	Fill with flowable fill
15 feet or more	< 24 inches	Plug ends
15 feet or more	>= 24 inches	Fill with flowable fill

15.1.11 Protection of Utilities

The Developer shall prepare a Protection Plan for all Utilities to be left in place and protected. The Protection Plan shall be submitted to IFA with the Stage 1 Design for review and comment. The Developer shall also obtain written approval of the Protection Plan from each Utility Owner that has a Utility that will be impacted by the Work.

15.2 Utility Coordination Requirements

The Developer shall provide information, as required, and maintain close coordination with IFA and the Utility Owners to ensure timely completion of Utility Adjustments.

The Developer shall coordinate with all Utility Owners within the Project ROW as needed to verify locations, identify potential conflicts, develop a Utility Adjustment Plan, enter into Developer Utility Agreements, and affect Utility Adjustments. The Developer shall schedule and notify Utility Owners sufficiently in advance of commencement of the Work to allow the Utility Owners to relocate or protect their facilities.

The Developer shall notify IFA at least five Business Days in advance of each meeting with a Utility Owner's representative, and shall allow IFA or its representative the opportunity to participate in the meeting. The Developer shall also provide to IFA, or its representative, copies of all correspondence between the Developer and any Utility Owner within seven days after sending or receiving.

The Developer shall let IFA or its representative know if any Utility Owner fails to cooperate. Refer to Section 5.5.7 of the PPA regarding such provisions.

The Developer shall allow for the time required to accomplish the tasks and activities necessary for Utility Adjustments in the Project Baseline Schedule and Project Status Schedule. The schedule shall be consistent with any times specified in the Developer Utility Agreements, or through coordination with the Utility Owner.

If a Utility Adjustment by a Utility Owner is contingent on the Work or another Utility Owner's work, the Developer shall keep all parties informed of the status and estimated completion date for the advance Work in order to give each Utility Owner as much notice as possible to schedule crews and material for its Utility Adjustment.

15.2.1 Developer's Coordination Requirements

The Developer shall perform the following activities as part of the Utility Adjustment Work:

1. Keep Utility Owners well informed of construction schedules and notify Utility Owners at least 48 hours in advance of any Work in the vicinity of the Utility. Coordination shall also occur for Utilities designated as Protection in Place, whether by the Developer or by the Utility Owner.

2. Keep Utility Owners well informed of changes to the Utility Adjustment Plans that affect their facilities.

3. Ensure Utility Owners are involved in making the decisions that affect their own Utilities so that they can provide uninterrupted service to their customers or minimize the interruption of services.

4. Give the Utility Owners 48-hour notice of potential impacts to service, or as agreed to in the Developer Utility Agreement.

5. Cooperate with the Utility Owners to resolve Adjustment and installation issues to the extent that such Adjustments and installations are part of the Utility Adjustment Work, as otherwise set forth in the PPA Documents, and without causing IFA to incur any unnecessary expense to the Project or causing the Utility Owners to incur unnecessary expense.

6. Act diligently in continuing the positive relationship that the Department has developed with the Utility Owners.

7. Coordinate with those Utility Owners that perform their own work by scheduling adequate time to accomplish their work.

8. Review each Utility and consider its effect on the Project.

9. Develop procedures for addressing Utility conflicts discovered during design development and Construction Work.

10. As part of the Utility Adjustment Plan, develop, negotiate, and provide a schedule in coordination with the Utility Owners for the design and construction of all Adjustments.

11. Identify critical activities and sequences as they affect the Utility Owners and plan to effectively mitigate impacts.

12. Designate a Utility Manager, experienced in Utility coordination, to be the principal contact for all Utility-related Project activities.

13. Through its Utility Manager, coordinate, cooperate, and work with those Utility Owner representatives on the Utility contact list (initially, the list set forth in RID, to be updated as new or substitute contacts are identified).

14. Monitor the progress of Utility Owner work and provide notice to IFA in accordance with Section 5.5.7 of the PPA.

15.2.2 Coordination of Design Reviews

The Developer shall invite affected Utility Owners to participate in relevant Developer and IFA Design Reviews. The affected Utility Owners can provide feedback on the Work, potential conflicts, resolutions, and Adjustments.

15.2.3 Meetings and Coordination

Within 30 Business Days of NTP1, the Developer shall schedule meetings with each Utility Owner potentially impacted by the Project, and invite IFA to attend. These meetings are for the purpose of reviewing all items related to Utility Adjustments, including all items that affect the Project Baseline Schedule, such as the time required to procure construction material, and the period of time Utility service may be curtailed. These meetings shall also be used to initiate Developer Utility Agreements.

The Developer shall, with IFA, schedule at least monthly joint Utility meetings with the Utility Owners to discuss Project progress, issues, and planned work for all phases of Utility Adjustments, including design and construction. These meetings shall include the Key

Personnel of Developer and IFA personnel that are responsible for Utilities. The Developer and IFA shall jointly develop the agenda for these meetings. The Developer shall be responsible for providing meeting facilities unless otherwise agreed upon. The Developer shall keep minutes of the meetings and distribute copies of the minutes. The Developer shall distribute copies of the minutes within five Business Days after the meeting date to participants, including representatives of the Utility Owners, even if not present, who have facilities within the Project Limits.

15.2.4 Utility-Specific Coordination Requirements

Indiana University

Indiana University owns an I-Light fiber-optic cable within existing SR 37 right of way between the cities of Bloomington and Indianapolis. Developer shall coordinate the Work to allow for Indiana University's fiber-optic cable to remain within the limited access portion of the Project Right of Way or to cause the Adjustment of this Utility to remain within limited access Project Right of Way, in accordance with the Developer Utility Agreement.

Vectren

Vectren owns a natural gas transmission pipeline within an easement adjacent to existing limited access right of way. The Developer shall coordinate the Work to allow impacted Vectren facilities to be relocated into a private easement adjacent to limited access Project Right of Way. Vectren's parallel transmission facilities shall not remain within limited access Project Right of Way.

Duke Energy

Duke Energy owns overhead transmission facilities within an easement adjacent to existing limited access right of way in the City of Bloomington. Duke's transmission facilities shall be allowed to remain within limited access Project Right of Way at new and existing interchanges. The Developer shall coordinate the Work to allow the transmission facilities to remain in their existing horizontal alignment. Transmission tower heights and locations may require Adjustment to accommodate the Work. Duke Energy guidelines and restrictions associated with its facilities are included in Attachment 15-1.

City of Bloomington

Adjustments to City of Bloomington Utilities; including wastewater, water, and storm sewer shall be performed in accordance with the city's construction specifications, included in Attachment 15-2. Adjustments to City of Bloomington lift station facilities shall be performed in accordance with Attachment 15-3.

South Central Indiana REMC

South Central Indiana REMC (SCIREMC) owns three-phase overhead electric lines and single-phase overhead electric lines running parallel with existing limited access right of way. The Developer shall coordinate the Work to relocate SCIREMC facilities within the Project Right of Way along local access roads where feasible. At other locations, the Developer shall coordinate the Work to relocate SCIREMC facilities into private easement adjacent to limited access

Project Right of Way. Parallel SCIREMC facilities shall not remain within limited access Project Right of Way.

Washington Township Water

Washington Township Water (WTW) owns water and sewer facilities that parallel the existing limited access right of way. WTW will be Adjusted as a Type 1 Utility Adjustment into private easement adjacent to the Project Right of Way. Parallel WTW facilities shall not remain within limited access Project Right of Way.

Smithville Communications Inc.

Smithville Communications Inc. owns telecommunications facilities that parallel the existing limited access right of way, and at some locations are located within existing limited access right of way. The Developer shall coordinate the Work to allow retention of existing Smithville Communications' parallel ducts within limited access Project Right of Way, where feasible. Where Smithville Communications' facilities are impacted by the Work, the Developer shall coordinate the Work to relocate Smithville Communications' facilities within the Project Right of Way along local access roads. Maintenance access to Smithville Communications' facilities shall be from outside limited access Project Right of Way.

15.3 Utility Design Requirements

The design of the Utility Adjustment Work and protections-in-place for the Project delegated to the Developer shall be in accordance with the PPA Documents. The Developer shall obtain the clarification of any unresolved ambiguity prior to proceeding with design or construction.

15.3.1 Responsibility for Design of Utility Work

After Developer has advanced the Project design sufficiently to clearly define Utility impacts, the Utility Adjustment Plans for affected Utilities shall be prepared.

Where the Utility Owner is preparing Utility Adjustment Plans (Type 2 or Type 3 Adjustments), Developer shall review and approve the Utility Adjustment Plans for consistency with the Project Final Design and prepare and negotiate a Developer Utility Agreement in accordance with the requirements of the PPA Documents, and shall obtain IFA's review and comment. IFA will provide written comments within 10 Business Days.

Where Developer is responsible for the design of the Utility Adjustment Plans (Type 2 Adjustments, as applicable) Developer shall ensure the Adjustment design is compatible with and interfaces properly with the Project. The Utility Owner shall be provided time to review and approve the Utility Adjustment Plans for consistency with company standards and specifications. The Utility Owner shall reply in accordance with the Developer Utility Agreement.

15.3.2 Identification of Utilities

Developer shall be responsible for confirming the exact location, type, and all other relevant information about each Utility in the Project area. If Developer discovers Utilities not previously identified that may be affected by the Project, Developer shall identify the affected Utility Owner, notify the Utility Owner, enter into a Developer Utility Agreement, and make arrangements for Utility Adjustment Work to proceed.

15.3.3 Changes to Utility Adjustment Design

Developer shall obtain written approval from the Utility Owner and allow for IFA review and comment for any proposed changes to the Utility Adjustment designs after the Utility Adjustment Plans are approved and incorporated into the Developer Utility Agreement.

15.3.4 Utility-Specific Design Requirements

Adjustments to the Indiana University I-Light fiber-optic cable shall be in accordance with the following requirements:

1. Splice spacing for replaced portions of fiber-optic cable shall be no more often than existing splice spacing. Developer is allowed up to four additional new splices; however an additional 50 feet of slack shall be made available at each splice point to add a splice closure. Maximum distance between splices shall be 30,000 feet. Splices shall be located within handholes.
2. At no time may the fiber-optic cable be completely severed. The fiber cable contains 36 fibers, 34 of which are in service carrying all Indiana University telecommunications and data services. Existing handholes are within the existing SR 37 limited access right of way.
3. Minimum depth of cover for fiber-optic cable shall be 36 inches. Beneath roadways, minimum depth of cover shall be 60 inches.
4. Minimum fiber performance shall be 0.25 dB per km at 1550 nm wavelength; nonzero dispersion shifted fiber.
5. Maximum number of ducts shall be four 1.25-inch innerduct. There are currently four installed; two are in use by Indiana University, two are owned by the State of Indiana.
6. Maximum downtime for splicing is no more than five minutes per pair of fiber. No more than two fibers can be down at one time.
7. Handholes shall be 36 inch by 24 inch composite concrete, placed immediately inside the limited access right of way fence, or as far away from roadways as possible, with H-20 loading at finished grade.
8. Fiber shall be 36-strand fiber OFS nonzero dispersion fiber cable, or approved equal; useable wavelengths are in the 1550 nm spectrum and using all waves for Dense Wave Division Multiplexing (DWDM).

Adjustments to Vectren's transmission pipelines and Work near Vectren's transmission pipelines shall be in accordance with the following requirements:

1. Vectren requires a minimum of 48 inches of cover over its transmission pipeline facilities. Beneath drainage ditches and roadways, a minimum of 60 inches of cover is required. Vectren requires 2 feet of vertical clearance between drainage structures and transmission pipeline crossings. Vectren requires 25 feet of horizontal clearance between its transmission pipeline facilities and foreign objects including bridges, foundations, retaining walls, parallel Utilities, and buildings.

2. The Developer shall submit a detailed blasting plan to Vectren for review prior to conducting any blasting near Vectren's pipeline. Blasting near active pipelines may be allowed on a case by case basis, and only under Vectren's approval.

3. Vectren will not Adjust transmission facilities during the winter heating season. Vectren's winter heating season generally begins in November and ends in April and is weather-dependent.

4. The Developer shall complete Vectren's pipeline crossing evaluation form for each piece of equipment that will cross an active pipeline. No construction is allowed within Vectren's transmission pipeline easement.

15.4 Utility Construction Requirements

Construction may ensue following the review and approval of the Utility Adjustment Plans by the Utility Owner or the Developer, as applicable; the review and comment by IFA; and the satisfaction of any applicable additional conditions to the commencement of construction specified in the PPA Documents, including Section 5.6.2 of the PPA.

Any subsequent revisions to the Utility Adjustment Plans shall require the approval of the affected Utility Owner and allow for IFA review and comment.

15.4.1 Construction Requirements

Developer shall comply with all environmental/erosion and sediment control and best management practices during construction using materials and supplies acceptable for use within a wellhead protection area to insure against contamination of the water supply. Dewatering conducted in these areas could adversely impact the supply of water to the plant, and plans for dewatering shall be reviewed and accepted by the applicable Utility Owner prior to implementation.

The Developer is required to follow the National Electric Safety Code when working in the vicinity of electric Utilities.

15.4.2 Record Drawings

For Utility Adjustment Work performed by the Developer, the Developer shall provide three sets of as-built Utility Plans; two provided to IFA for the permitting agency or INDOT, and one for the Utility Owner. The as-built Utility Plans shall comply with as-built requirements stipulated in the Utility regulations and shall be part of the Project Record Drawings.

For Utility Adjustment Work performed by the Utility Owner, the Utility Owner will be required, as defined in the Developer Utility Agreement, to provide three sets of Record Drawings to the Developer. The Developer shall provide two sets to IFA for the permitting agency or INDOT. The as-built Utility Plans shall comply with the as-built requirements stipulated in the Utility regulations and shall be part of the Project Record Drawings.

15.5 Other Utility Requirements

15.5.1 Developer-Caused Changes to Utility Owner Work

If the Utility Owner maintains responsibility for the design and, as applicable, construction of the Utility Adjustment and the Developer revises the plans affecting the cost or schedule after the Developer Utility Agreement has been executed, the Developer shall be responsible for the additional cost and, as applicable, any schedule delays related to the change.

15.5.2 Construction Record

The Developer shall maintain a record of the Utility Adjustment Work performed by the Developer. Individual files shall include a record of the following information:

1. Utility Adjustment Plans that have been reviewed by the Utility Owner and received review and comment by IFA.
2. Notification of construction dates.
3. A record of meetings with the Utility Owner.
4. A signature of the Utility Owner's representative on the Utility Adjustment Plans.
5. A record of the Utility Owner's representation at design and construction meetings.
6. Any revisions to the Utility Adjustment Plans.
7. Dates of construction completed.
8. All other as-built requirements stipulated in the applicable Adjustment Standards.
9. Developer Utility Agreements.
10. Two sets of the Record Drawings, as they pertain to Utilities, shall be provided to IFA.

15.5.3 Utility Damage Reports

The Developer shall be responsible for developing a Utility Damage Report form to use in the event a Utility is damaged. The form shall include sufficient information, such as the location; date; time; Utility Owner; Utility locate details; the name of the Construction Manager and witnesses; a description of the damage; and the signatures of the Developer superintendent, Utility Owner, and locate service. A blank form shall be submitted to IFA for review and comment prior to the start of Construction Work.

The Developer shall immediately report any damage to Utilities to the Utility Owner and IFA, and fully cooperate with the Utility to ensure the Utility's safe and timely return to operation. The Developer shall complete and submit the Utility Damage Report form to IFA within two days of the damage.

15.5.4 Utility Adjustment Master Plan

IFA has provided Utility Information in the RID regarding the existing Utilities within the Project ROW. The information is based on Utility Owners' record plans; field locations; and, in some instances, vertical elevation. Within 30 days after the issuance of the NTP1, the Developer shall

submit an initial Utility Adjustment Master Plan to IFA for its records showing all known existing Utilities and proposed Utility Adjustments. The Utility Adjustment Master Plan shall be a living document throughout the life of the Project; the Developer shall update it and submit it to IFA monthly to reflect all changed information then known to the Developer, and shall distribute copies for discussion at scheduled Utility meetings. Updates shall be submitted to IFA for review and comment.

15.6 Railroad Coordination

15.6.1 General Requirements

This section defines the criteria required for the Project to accommodate railroads crossing the Project ROW. The Developer is responsible for all coordination with all owning and operating railroads that may be impacted by the Work, preparing and negotiating any agreement for construction and maintenance, and complying with and paying all costs associated with the Work specified herein, including all costs related to the Railroad Agreements.

15.6.2 Railroad Design Standards

The Developer shall design the Work affecting railroad facilities following current Standard Industry Practices, such as FHWA *Railroad-Highway Grade Crossing Handbook*, AREMA, and MUTCD, and incorporating the usual and customary design standards and operating requirements of the owning and operating railroad(s) that has, or is expected to have, an agreement with IFA. However, wherever a conflict arises between any details in the design, the criteria as detailed by the railroad shall be governing parameters.

Construction details and specifications shall conform to the Department standard specifications and the rules, regulations, and requirements of the owning and operating railroads, including those related to safety, fall protection, and protective equipment. Draft copies of the Special Provision for the Protection of Railway Interest are included in the RID for each railroad. The Developer shall coordinate with the railroad to finalize the special provisions and comply with the finalized special provisions at no additional cost to IFA.

15.6.3 Design Criteria in Railroad Right of Way

1. The design of any railroad facilities shall conform to the requirements of the owning and operating railroad specifications and the provisions set forth by the Railroad Agreement.
2. All railroad tracks and other railroad property shall be protected from damage during the Work.
3. All bridges over railroad facilities shall conform to a minimum vertical clearance over railroad facilities, as approved in the Railroad Agreement.
4. All horizontal clearances shall conform to the operating railroad specifications; and, crash walls shall be provided as required by the operating railroad specifications.
5. All substructure elements within 25 feet of the centerline of tracks shall be designed and constructed with a crash wall per AREMA requirements.

15.6.4 Coordinating Design

The Developer shall coordinate the Project design with the owning and operating railroad. This coordination shall include meetings, Plan submissions, and resolution of pertinent commentary provided by the railroad. The Developer shall fully consult the railroad in such a manner as necessary to ensure compliance with all standards and a viable Final Design. The railroad has final approval rights for the design of Work affecting its facilities.

CSX Transportation and the Indiana Rail Road Company own existing tracks that cross Project ROW near SR48/3rd Street at SR 37. CSX Transportation facilities cross beneath SR 37, while Indiana Rail Road Company facilities cross above SR 37. Contacts for these railroad companies are as follows:

<u>CSX Transportation</u>

Ms. Amanda DeCesare
Public Project Manager
CSX Transportation Inc.
1717 Dixie Highway, Suite 400
Fort Wright, KY 41011
Telephone: (859) 426-6924

<u>Indiana Railroad Company</u>

Mr. Peter Ray
Vice President - Engineering
The Indiana Rail Road Company
101 West Ohio Street, Suite 1600
Indianapolis, IN 46204
Telephone: (317) 616-3443

15.6.5 Design Costs

During negotiation and design coordination, the Developer shall secure an estimate of all anticipated costs from each owning and operating railroad. The costs shall be reviewed by the Developer and IFA and determined as compliant with federal and state standards and will be the basis of the Railroad Agreement. The Developer shall submit the estimate to IFA for review and comment. The IFA will provide comment within ten (10) Business Days.

15.6.6 Records

The Developer shall maintain a record of all negotiation, coordination, and construction efforts in relation to the railroad involvement. These records shall be provided in copy to IFA as completed. Specific documents required include: correspondence, meeting minutes, negotiations, Force Account Estimates from the railroad for their work, design comments, agreements, inspection records, invoices, and change orders.

15.7 Project Work Affecting Railroad Operations

Where the Project crosses or affects a railroad ROW, operations, or facilities, the Developer shall coordinate the Work with the owning and operating railroad(s), and the Department Capital Program Management's Railroads Team, as appropriate.

15.7.1 Schedule

The Developer shall be responsible for obtaining all required approvals, permits, petitions, and agreements required for any railroad-related Work. All costs, fees, and Work associated with these matters shall be the responsibility of the Developer. The Developer shall be responsible for including and incorporating all railroad-related items into the Project Schedule. No time extensions will be granted to the Developer for the railroad-related Work.

Developer shall enter into other agreements with, and obtain any permits from; Governmental Entities or others that are necessary to perform the Work described herein or that otherwise apply to Work hereunder, except for those items expressly described in this Section 15.7 as being the responsibility of IFA.

15.7.2 Agreement for Construction and Maintenance

Whenever an agreement for construction and maintenance within railroad ROW between the owning and operating railroad and IFA is required, the Developer shall prepare the draft Railroad Agreement and all the documentation required to obtain the Railroad Agreement, including (a) any Railroad Agreement documents on behalf of IFA, and (b) the Plans and Construction Documents. Developer shall revise the documentation as necessary to finalize and obtain the Railroad Agreement.

The Developer shall submit the draft Railroad Agreement to IFA for review, as required by IFA. The Developer shall coordinate with IFA the required Railroad Agreement format and submittal procedure. After all comments have been incorporated or satisfactorily resolved by the Developer, railroad, and IFA, the Developer shall sign the Railroad Agreement, submit it to the railroad for signature, and then provide the final Railroad Agreement to IFA for execution.

The Developer shall comply with all requirements contained in the Railroad Agreement, which compliance is included as part of the Work. Developer shall pay, as part of the Work, for the railroad's expenses relating to Work hereunder that the Railroad Agreement states are payable by IFA, within the time specified in the Railroad Agreement, including all costs associated with railroad flaggers. Developer shall consult with the railroad owners for clarification and confirmation of the validity of the standards represented in these provisions.

15.7.3 Operation Safety

The Developer shall arrange with the owning and operating railroad for railroad flagging as required. These flagging costs shall be included in the Railroad Agreement and all flagging costs, including those in excess of the estimate provided in the Railroad Agreement, are included in the Work. The Developer shall comply with the owning and operating railroad's requirements for contractor safety training prior to performing Construction Work or other activities on the owning and operating railroad's property.

15.7.4 Railroad Right-of-Entry Agreement

In order to enter the operating railroad's ROW to perform the Work, the Developer shall have secured its right-of-entry from the railroad and shall coordinate the arrangements of the necessary agreements directly with the operating railroad.

15.7.5 The Developer Right-of-Entry Agreement

The Developer shall cooperate and coordinate with all owning and operating railroads for access by the owning and operating railroad and, as applicable, each railroad's agents to the railroad ROW as necessary for rail maintenance and operations activities performed by the railroad or its agents..

15.7.6 Insurance Requirements

Developer shall procure and maintain any insurance coverage as may be required by any owning and operating railroad as a condition of the owning and operating railroad's consent for entry onto railroad facilities or property. Developer shall comply with all insurance requirements set forth in the unique railroad special provisions, Railroad Agreement(s), rights of entry, or other agreements or approvals required for performing Work on or near the ROW of any owning and operating railroad.

All insurance policies shall be in a form acceptable to the owning and operating railroad. The original Railroad Protective Liability Insurance Policy shall be submitted to the railroad with the railroad as the name insured. Copies of all other insurance policies shall be submitted to the owning railroad, operating railroad, IFA and be approved by the railroad prior to any entry by the Developer upon railroad property.

15.8 Railroad Construction Requirements

The Developer shall comply with all construction requirements and specifications set forth by the owning and operating railroad, including those requirements set forth in the Railroad Agreements.

The Developer shall be responsible for scheduling the Work to be completed by the owning and operating railroad or its contractor, including any Work to be completed by the railroad's own forces. The Developer shall be responsible for all costs associated with the Railroad Force Account Work.

15.8.1 Cost of Reimbursements

The Developer shall be responsible for all reimbursement of costs to owning and operating railroads, and shall be responsible for reimbursing all costs that owning and operating railroads incur in adjusting their facilities or operations, as applicable, to accommodate the Work.

15.8.2 Monitoring Construction Management Costs

The Developer shall monitor the costs associated with the construction of the Project as it relates to railroad coordination. The Developer shall provide, at a minimum, monthly reports to IFA on the usage of a railroad flagman. The Developer is responsible for all flagging costs.

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16 INTELLIGENT TRANSPORTATION SYSTEM

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17 RIGHT OF WAY

17.1 Project ROW

IFA will acquire and provide the Project Right of Way. Attachment 17-1 (ROW Work Map) identifies the Project ROW available to the Developer for the Work. Acquisition of Additional Properties and Project Specific Locations shall be governed by and subject to Section 5.4 of the PPA. All agreements, easements, rights of entry and other instruments under which IFA has received or will receive title, rights of entry, or rights of access on and to lands owned by Public entities are set forth in the RID.

Should Developer require Additional Properties, it shall comply with the requirements of Section 5.4 of the PPA. In addition to complying with the requirements of the PPA, Developer shall be responsible for:

1. obtaining a concurring opinion from IFA as to the necessity for said Additional Properties;
2. performing all necessary environmental studies, reports, and public involvement activities to comply with the National Environmental Policy Act (NEPA) requirements;
3. preparing and obtaining approval for final ROW Plans for the Additional Properties;
4. coordinating with Utility Owners all adverse impacts to Utilities caused by Developer's proposed Additional Properties, including acquiring any Replacement Utility Property Interests and Adjusting the impacted Utility; and
5. all costs associated with this Work, as well as IFA's costs and expenses incurred in acquiring the property, as more specifically provided in PPA Section 5.4.5.

Any Additional Properties acquired shall comply with Department ROW and real estate manuals, in addition to any other applicable Law, Governmental Approval.

17.2 Monument and Fence Construction

Developer shall design and construct limited access Project Right of Way fence, survey monumentation assemblies, reference monuments, and any other items associated with monuments in accordance with Project Standards, including fence design and construction adjacent to residential or commercial properties with maintained lawns. All existing limited access right of way fence shall be replaced.

Developer shall install gate in the limited access Project Right of Way fence at the following location(s), in accordance with Project Standards:

1. Parcel 671 (Principal Site), located approximately 250 feet south of Indian Creek, west side of I-69. Developer shall obtain Approval of gate location from IFA.

17.3 ROW Acquisition Status

See Attachment 17-2 for the current ROW Acquisition Status.

Developer will be updated regularly on the status of the acquisition and relocation of the parcels.

Title reservations, conditions, easements, or encumbrances of record or not of record, on any parcel in the Project Right of Way/Project Right of Entry are described in Attachment 17-2.

18 OPERATIONS AND MAINTENANCE

18.1 General

Developer shall be responsible for developing and providing the resources, equipment, materials, and services required to operate and maintain the infrastructure within the O&M Limits in accordance with the requirements of the PPA Documents during construction and throughout the Operating Period. Developer shall provide sufficient levels of properly trained personnel, on-Site and off-Site facilities, storage areas, garages, fleet vehicles, computer hardware and software, tools, and other items as required to operate and maintain safe, reliable roadways and facilities, with the main objectives to maximize public safety, reliability, and roadway availability. To this end, Developer shall coordinate, plan, and perform O&M During Construction and O&M After Construction required by the PPA Documents including this Section 18 in a manner that shall provide safe conditions for the maintenance staff and the motorists using the facilities while minimizing traffic disruptions.

18.1.1 General Operations and Maintenance Obligations

Developer shall be responsible for all tasks and activities related to O&M During Construction and O&M After Construction, including but not limited to the following:

1. Maintain the Project and Related Transportation Facilities within the O&M Limits in a manner appropriate for a facility of the character of the Project and in compliance with the requirements of the PPA Documents.
2. Minimize delay and inconvenience to Users and, to the extent Developer is able to control, users of Related Transportation Facilities.
3. Identify and correct all Defects and damages to the Project from Incidents.
4. Monitor and observe weather and weather forecasts to proactively deploy resources to minimize delays and safety hazards due to heavy rains, snow, ice or other severe weather events.
5. Remove debris, including litter, graffiti, animals, and abandoned vehicles or equipment from the Project ROW.
6. Minimize the risk of damage, disturbance to or destruction of third party property during the performance of maintenance activities.
7. Coordinate with and enable the Department and, as applicable, others with statutory duties or functions in relation to the Project or Related Transportation Facilities to perform such duties and functions.
8. Perform systematic Project inspections, periodic maintenance, and routine maintenance in accordance with the provisions of Developer's Maintenance Plan and Developer's Safety Plan.
9. Providing an OMP that identifies all of the functions, procedures, and manuals necessary to operate and maintain the Project in accordance with the requirements of this Section 18.

10. Coordinate with IFA and provide operations and maintenance training of at least 10 Department personnel upon Substantial Completion and again prior to the Termination Date so the Department personnel have a complete understanding of the facility, the method of operating all aspects of the O&M Limits, the maintenance program, plans, tasks, reports, and activities for the maintenance scope of the Project.

Developer is responsible for providing all resources necessary for the performance of the Work and as required to comply with the PPA Documents, the OMP, and the MP. The Developer shall be responsible for complying with the requirements of the Sustainability Management Plan.

The O&M Limits comprise an operating facility that shall be available 24 hours per day, seven days per week, 365 days per year. Developer shall provide staff for these hours of operation. Developer is not responsible to provide staffing for a TMC.

Developer's procedures for O&M During Construction and O&M After Construction shall be developed in accordance with these requirements and shall include the necessary provisions and requirements for compliance with the PPA Documents.

Developer shall be responsible for the operation and maintenance of the bypass described in Section 9.3.3.2 (Chambers Pike Bypass). Developer shall coordinate with the Department and the applicable third parties the timing, use, and vehicular requirements of the bypass. Developer shall modify all guardrail, signage, and other facilities as required for safe operation of the bypass. Upon completion of each use of the bypass, Developer shall restore all facilities to the pre-use condition or better.

18.1.2 Standards and References

Developer shall perform O&M During Construction and O&M After Construction in accordance with the applicable requirements of the PPA Documents, including Project Standards and this Section 18; Governmental Approvals; and applicable Laws. Deviations in performance, operation, and maintenance standards are subject to Section 6.1.2 of the PPA.

18.1.3 Developer's Obligation to Remedy and Repair

For Category 1 Defects, Developer shall take necessary action such that any hazard to Users is mitigated within the period specified in the column entitled "Category 1 Hazard Mitigation" in the Performance and Measurement Tables provided in Attachment 18-1 (Performance and Measurement Tables), and shall permanently remedy the Defect within the period specified in the column entitled "Category 1 Permanent Remedy" in the Performance and Measurement Tables provided in Attachment 18-1. Permanent Remedy, as defined and identified in Attachment 18-1, shall be performed within the time period identified for the Permanent Remedy. Hazard Mitigation, as defined and identified in Attachment 18-1, shall be performed within the time period provided and shall continue until a Permanent Remedy is completed.

For Category 2 Defects arising after Substantial Completion, Developer shall undertake the permanent repair within the period specified in the column entitled "Category 2 Permanent Repair" in the Performance and Measurement Table 18-B provided in Attachment 18-1 (Performance and Measurement Table for O&M After Construction).

For Category 2 Defects arising before Substantial Completion, Developer shall undertake the necessary repair within the time period specified in the column entitled "Category 2 Base

Repair" in the Performance and Measurement Table 18-A provided in Attachment 18-1 (Performance and Measurement Table for O&M During Construction). The necessary repair shall be the reinstatement of the condition of the Element to meet or exceed the condition recorded within the Baseline Asset Condition Report (BACR) unless a more stringent condition is specified in Table 18-A.

Developer shall use the results of the inspections described in its Maintenance Plan and other relevant information to determine, on an annual basis, the Residual Life of each Element of the Project within the O&M Limits and the scope necessary for the Rehabilitation Work Schedule. Rehabilitation Work shall be performed at the point in time necessary to satisfy requirements for Useful Life provided in Section 19.5.

18.1.4 Operations and Maintenance Limits

18.1.4.1 O&M Limits Drawings

Conceptual O&M Limits are provided in the Reference Information Documents. As part of Developer's design process, Developer shall update O&M Limits identified in Exhibit 2-A of the Agreement and prepare Final O&M Limits Drawings identifying Construction Period O&M Limits and Operating Period O&M Limits. Developer shall submit Final O&M Limits Drawings to IFA for approval and obtain approval before commencement of Construction Work.

18.1.4.2 Construction Period O&M Limits

The Construction Period O&M Limits shall include all areas identified in Section 18.1.4.3 (Operating Period O&M Limits) plus all Elements and ROW of each local and State road within the Project Limits. The Construction Period O&M Limits shall apply from the time that Developer first undertakes any Construction Work associated with each local or State roadway, until Substantial Completion. If Work associated with more than one local or state roadway is included in a TTCP, Construction Period O&M Limits shall apply from the time that Developer first undertakes any Construction Work associated with any of the local or state roads included in such TTCP, until Substantial Completion.

18.1.4.3 Operating Period O&M Limits

The O&M Limits of I-69 Section 5 shall start at the intersection of That Road West/SR 37 and extend to the south bridge approach of the Indian Creek Bridge (Str. No. 37-55-3106), and include the I-69 Mainline, all I-69 Mainline bridges, I-69 entrance and exit ramps, bridges that cross the I-69 Mainline, and fences along the Mainline.

Except as stated otherwise in the PPA Documents, Operating Period O&M Limits shall include the following items:

- Where the limited access Project ROW is coincident with the Project ROW boundaries, all areas and Elements extending to the Project ROW boundaries;
- Where the limited access Project ROW does not coincide with the Project ROW boundaries, the Mainline and all areas and Elements between the Mainline and the limited access Project ROW boundaries, consistent with the principles and extents defined on the Conceptual O&M Limits drawings, including any traffic barriers separating the adjacent cross road or frontage road from the Mainline and any drainage structures associated with the barrier;

- Where cross roads have interchanges with I-69, all areas and Elements of the cross roads within Project ROW boundaries up to the ramp termini, consistent with the principles and extents defined on the conceptual O&M Limits drawing; and
- All temporary right of way in effect prior to Final Acceptance.

The O&M Limits for Operating Period O&M Limits do not include the following items:

- Frontage roads and cross roads beyond the ramp terminals where such roads have interchanges with I-69; and
- The Indiana Rail Road Company overpass located approximately 1,300 feet south of the SR-48 interchange.

18.1.4.4 Scope of O&M During Construction and O&M After Construction

O&M During Construction and O&M After Construction include the operations and maintenance of all items within the O&M Limits, unless noted otherwise in this Section 18, with the exception of snow and ice removal, as described in Sections 18.3.1.9.2 through 18.3.1.9.4, on the following overpasses: N Crossover Road West/Chambers Pike East Overpass, Kinser Pike West/East Overpass, Arlington Road Overpass, Vernal Pike Overpass, and Rockport Road West/East Overpass.

O&M During Construction and O&M After Construction within the O&M Limits shall include:

- Traffic signals where Mainline interchange ramps intersect cross roads, including signals on the ramp and signals on the cross road;
- Maintenance of the landscaped elements; and
- Incident response

18.1.4.5 Developer Use of Excess Lands

If Developer proposes to use any excess lands (as defined in Chapter V, Part P of the Indiana Right of Way Engineering Manual) for purposes related to O&M Work, such as garages and storage facilities, Developer shall submit a request in writing to INDOT, and the request will be considered during INDOT's determination of the use or disposal of such lands. INDOT will not approve any facility within the limited access Project ROW. IFA will not acquire Additional Properties for the purpose of any such facilities. Where acquisition or a partial lot is contemplated, INDOT will not consider requests by Developer for such facilities in determining whether to acquire an entire lot, parcel or tract. Developer is solely responsible for any Governmental Approvals required in connection with such facilities. All such facilities shall be removed upon expiry or termination of the Agreement.

18.1.4.6 Utilities Associated with O&M Work

Developer is not responsible for utility costs associated with roadway lighting, aesthetic lighting, or other utility services required for the normal operation of the Project, as part of either O&M During Construction or O&M After Construction. Developer is responsible for all utility costs associated with Developer's Work, including any such costs to operate Developer's maintenance facilities, office facilities, or other similar facilities under Developer's control during construction and throughout the Operating Period.

18.1.5 Operations and Maintenance Plan

Developer shall prepare an OMP as a component of the PMP which shall meet the requirements set forth in this Section 18.1.5. The OMP shall be submitted in accordance with Attachment 1-1 for O&M During Construction and shall be updated in accordance to Attachment 1-1 for O&M After Construction and Section 6.4.5 of the PPA. The OMP shall be updated annually or more frequently, as necessary, to indicate changes to operating protocols, agreements, and interactions with other entities and to indicate the revised operating requirements for equipment and systems that have been revised, upgraded, and, as applicable, replaced.

The OMP shall identify the operating protocols, agreements, and interactions with other entities and agencies, such as adjacent roadway authorities, police, and fire.

The operating procedures and protocols shall include all traffic control, Incident response, and other procedures as necessary to operate the facility. The OMP shall include the requirements for work zone safety, vehicular accident tracking, weather-related Incidents/Closures, security-related Closures, Hazardous Material Management, and roadway traffic Closure/shutdown procedures. The OMP shall include all requirements of the TMP applicable to O&M Work as set forth in Section 12 of the Technical Requirements.

The OMP shall include detailed procedures and protocols for the operation of the systems as necessary to maintain a safe environment on the roadway and bridges to meet the Performance Requirements identified within PPA Documents, including all of the Technical Provisions. The operating protocols and procedures shall address the mechanical systems, electrical systems, and any other systems that may be required by the Project and provided by Developer to support the operation of the bridges and roadway. The OMP shall include any ancillary facility operating procedures and protocols as necessary for the reliable, safe operation of the bridge and roadway systems equipment included therein.

The OMP shall comply with all requirements of the PPA Documents and include the information listed below. Attachment 1-1 provides the schedule and approval requirements for elements of the OMP. In accordance with Section 6.4.5 of the PPA, the initial OMP shall address the following items for O&M During Construction, and subsequent updates of the OMP shall address the necessary transitions to O&M After Construction and O&M Work during the Operating Period.

1. Developer organization chart and staffing plan for O&M During Construction and O&M After Construction, including all anticipated positions, work locations, and work hours necessary for Developer to perform the Work;

2. Detailed outline of the qualifications necessary for each Developer staff position;

3. List of the various entities and agencies that Developer anticipates coordinating with during construction and the Operating Period, including individuals within each entity and agency and their contact information (contact person, address, telephone numbers, website address);

4. List of documents that provide a basis or necessary reference for the OMP;

5. Outline of Developer's self-monitoring processes and procedures to be used to monitor compliance with PPA requirements;

6. Processes and Procedures for preparing and submitting the Operations Report;
7. Processes and Procedures for preparing and submitting the Maintenance Work Report;
8. Processes and Procedures for calculating and preparing invoices for Quarterly Payments in accordance with Article 10 of the PPA;
9. Processes and procedures for tracking and reporting Defects, Noncompliance Events, Noncompliance Points, and Unavailability Events accumulated throughout construction and the Operating Period;
10. List of all Noncompliance Events, Noncompliance Points, Defects and Unavailability Events accumulated during construction and the Operating Period that are equivalent to those specified within the PPA Documents, including this Section 18;
11. Developer's processes and procedures for monitoring and verifying O&M Contractor compliance with all O&M requirements specified in the PPA, including those contained in the approved PMP, the approved OMP, the approved MP, and Good Industry Practice;
12. Copies of all operations forms, checklists, fault detection logs, etc.;
13. Developer's processes and procedures for Hazardous Materials Management;
14. Developer's processes and procedures for planning and implementing Planned Maintenance;
15. Developer's processes and procedures for planning and implementing Routine Maintenance;
16. Developer's processes and procedures for planning and implementing Rehabilitation Work;
17. Schedules for Planned Maintenance, Routine Maintenance and Rehabilitation Work;
18. Maintenance dispatching processes and procedures;
19. Communications processes and procedures;
20. Winter maintenance processes and procedures;
21. List of vehicles, tools, and major equipment necessary for Developer to satisfy its obligations for O&M During Construction and O&M After Construction, including Incident response;
22. List of real estate, facilities, computers, software, and other major assets or items necessary for Developer to satisfy its obligations for O&M During Construction and O&M After Construction;
23. Schedule for Developer's program of inspections required by the PPA Documents;
24. Drawings that indicate the types of work for O&M During Construction and O&M After Construction to be provided and the physical limits or boundaries of each type;
25. Form of the Operations Report;
26. Description and form of the Annual Budget (if required by Lender);

27. Processes and procedures for completing Emergency-related repair work in accordance with Section 9.2 of the PPA; and

28. Processes and procedures Developer will implement to cooperate with public law enforcement and emergency response agencies in accordance with Section 6.11 of the PPA; and

29. A transition plan that details how Developer shall work with the Department to train and coordinate with Department staff in accordance with Section 18.1.1, and that would ensure a seamless transfer of O&M responsibilities to the IFA.

18.1.6 Meetings

Developer shall conduct monthly meetings with the appropriate Department representatives to discuss O&M During Construction and O&M After Construction. The items to be discussed shall include topics such as the following: future lane Closures; the maintenance activities of the previous month, Planned Maintenance for the next month, Incidents/accidents; a calculation showing the adjustments to the Availability Payment; and an assessment of Noncompliance Points, Unavailability Events, and any other pertinent information related to O&M During Construction and O&M After Construction. Developer shall also participate in quarterly traffic incident management team meetings. IFA may request a meeting at any time to discuss any issues related to O&M During Construction and O&M After Construction.

18.1.7 Safety

Developer shall conduct all Work in accordance with all applicable Laws, including those pertaining to safety and Safety Standards, for O&M During Construction and O&M After Construction. Developer shall perform all Work with the goal to maximize the safety of the public and Developer's employees for O&M During Construction and O&M After Construction. Some hazards include high-voltage electrical equipment, confined spaces, traffic, exposure to Hazardous Materials, and other conditions not specifically identified herein. Developer shall develop an O&M Safety Plan that includes staff training, safety procedures, and protocols to address the hazardous conditions associated with Developer's work in O&M During Construction and O&M After Construction. The provisions of Section 7.9 shall apply during construction and throughout the Operating Period. The O&M Safety Plan shall be an integral part of the Operations and Maintenance Plan, shall be incorporated into the Project Safety Plan and shall be reviewed and approved in accordance with the Project Safety Plan. Developer shall remove and replace any personnel or O&M Contractors who are jeopardizing safety, disregarding safety rules and procedures, or acting in a negligent or irresponsible manner.

18.1.8 Quality Management Requirements

Developer shall prepare an O&M Quality Plan as an integral component of the Operations and Maintenance Plan. The O&M Quality Plan shall be submitted in accordance with Attachment 1-1. Developer's O&M Quality Plan shall fully comply with the requirements of the PPA Documents and shall include O&M Contractor log forms, procedures, and other means as necessary to create a system that monitors and captures the necessary information and data. Developer's O&M Quality Plan shall include a quality management system that defines how the performance of the Developer's work is monitored for O&M During Construction and O&M After Construction. The O&M quality management system shall provide the means to evaluate Developer's level of performance with respect to the Performance Requirements.

The O&M Quality Plan shall also provide the system and procedures to monitor and capture the necessary maintenance information and data and compare it to the Planned Maintenance schedule and Rehabilitation Work Schedule and, ultimately, document any maintenance Noncompliance Points imposed on Developer. The O&M Quality Plan shall identify the means for monitoring and evaluating all aspects of the performance indicators specified in this Section 18. All of the supporting data and calculations used in the O&M Quality Plan shall be submitted to IFA in the quarterly Operations Report and the PPA Documents.

As part of the O&M Quality Plan, Developer shall develop a detailed quality assurance system. The quality assurance system shall be developed for validating the information, accuracy, and results of the O&M Quality Plan. The quality assurance system shall include procedures to validate the data, times, dates, O&M Contractor logs, other information, and calculations that are the basis for determining any Quarterly Payment Adjustments. Developer shall include in the quarterly Operations Report a section that identifies the results of the O&M quality management system.

Developer shall provide appropriate quality program training for its staff for O&M During Construction and O&M After Construction. This training shall convey the importance of the O&M quality management system.

Developer shall not alter any operations logs, maintenance logs, procedures, inspection forms, or any other information that is used to monitor the performance indicators.

18.1.9 Reporting and Books and Records

Developer shall, in accordance with Section 18.2.2 and Section 11.2 of the PPA, deliver quarterly Operations Report to IFA for its records, all in accordance with the PPA Documents and quality management system. IFA will perform audits of work throughout O&M During Construction and O&M After Construction using sources such as logs, activities, and the recordkeeping efforts of Developer to ensure compliance. The Operations Report shall include a high-level summary of Noncompliance Events, Unavailability Events and Noncompliance Point assessments. The report shall also include, in an organized and readable format, all of the supporting information and detailed data necessary to confirm the occurrence of any Noncompliance Events, Unavailability Events and any Defects or other occurrences that result in Noncompliance Point assessments. See Article 23 of the PPA for additional requirements regarding Developer Books and Records and IFA audits.

18.1.10 IFA Audits

IFA will perform periodic audits of Developer's work throughout O&M During Construction and O&M After Construction to verify that the OMP meets the requirements specified within this Technical Provision. Developer shall provide IFA access to all personnel files, records, logs, data, databases, and any other information related to the OMP, such that IFA can verify that all of the requirements of this section are performed appropriately. Developer shall maintain accurate, updated files that are accessible for this purpose. See Section 23.2 of the PPA for additional IFA audit rights.

18.1.11 Baseline Inspections and Baseline Asset Condition Report

Developer is responsible for the performance of inspections and / or tests to determine the condition of each applicable Element prior to NTP2 (the "Baseline Inspections") and the delivery

of the Baseline Asset Condition Report (BACR).

Developer shall submit to IFA for approval the proposed scope of Baseline Inspections, together with the methodology proposed for the inspections and / or tests and a list of no less than three testing organizations financially independent of Developer, having the experience and qualifications necessary to perform the Baseline Inspections, and having third party quality certification.

Upon IFA's approval of the scope of the Baseline Inspections, the methodology and the list of testing organizations, Developer shall cause the Baseline Inspections to be performed by one or more of the testing organizations and shall provide to IFA a minimum of ten Business Days notice to witness the inspections and/or tests.

Developer shall cause the testing organizations(s) to prepare and shall submit to IFA for approval the Baseline Asset Condition Report (BACR), 30 days prior to NTP 2. The submittal shall include the condition of each Element shown in Attachment 18-3 (Baseline Asset Condition Report Framework), except to the extent that such condition is already shown in the BACRF.

18.2 Operations Requirements

18.2.1 Introduction

Developer shall be responsible for operating safe, reliable roadways and facilities within the O&M Limits, with the main objectives to maximize safety, reliability, and roadway availability. Developer shall be responsible for operating the roadway, ancillary facilities, and ancillary facility systems/equipment within the O&M Limits. All of the Performance Requirements set out a minimum standard; however, Developer shall, at all times, demonstrate the standard of care of a reasonable contractor in like circumstances and Good Industry Practice.

Developer shall provide and maintain a sufficient number of properly trained operations staff to perform the operating duties specified herein and the activities identified in the OMP and MP. Operations personnel shall be available 24 hours per day, every day of the year, to respond to urgent issues and Incidents, as defined within the OMP. Developer shall provide all of the equipment, personnel, resources, training, and facilities required to meet these requirements. Developer's operations staff shall be trained to assist and coordinate with IFA and, as applicable, agencies that would be involved with responses to Emergencies and Incidents, and other agencies as required.

Developer shall report any Project Defect, Closure, or unscheduled Permitted Closure to IFA.

18.2.2 Operations Report

The quarterly Operations Report shall identify all of the Defects, Incidents, accidents, Incident response times, operations logs, service requests, severe weather Incidents, and security Incidents that occur over the preceding quarter. The reports shall include a system for referencing each activity/event and the time and date of commencement and date of resolution.

Quarterly Operations Report shall include, at a minimum, the following data and information:

1. Summary of the status of all segments for the month identifying all Closures, Permitted Closures, and Unavailability Events as defined by the PPA.

2. Summary of Closures, Permitted Closures, compliance hours, and Planned Maintenance hours for the coming month. This report shall include details describing the location, duration, and reason of each.

3. Non-Conformance Reports: For each Defect in the Project Elements, the report shall identify the location, the nature and cause of the Defect and the steps that will be, or have been, taken to address the Defect.

4. O&M Contractor event log data, including all operator actions and event details for traffic and systems events, Incidents, security Incidents, weather Incidents, and the details of Developer's Incident response, including response time data, response records, etc.

5. Developer's Incident response logs, including a time-based report of all actions and activities performed by Developer.

6. Quality assurance review of the O&M Contractor actions and lessons learned where appropriate.

7. Summary of staff and hours worked for the month.

8. Summary of Closures, Permitted Closures, and Planned Maintenance hours for the coming month. This report shall include details describing the location, duration, and reason of each.

9. Maintenance Work Report.

10. Any additional information required pursuant to Section 11.2.1.3 of the PPA.

18.2.3 Planned Maintenance Closure Criteria after Substantial Completion

This Section 18.2.3 defines the restrictions and prohibitions applicable to Closures for Planned Maintenance during the Operating Period. For restrictions and prohibitions applicable to Construction Closures before Substantial Completion refer to Section 12.4.8. All Closures of the I-69 Mainline shall comply with INDOT Interstate Highways Lane Closure Policy, as may be modified from time to time. The I-69 Mainline will be designated as an "Executive Office Approval Only" route. Refer to Section 18.4.1.1 below for deadlines for the submittal of the annual Planned Maintenance schedule and the monthly Planned Maintenance and Routine Maintenance schedules. Any deviation from the monthly Planned Maintenance schedule shall be coordinated with the Department no more than 14 days in advance, provided that any deviation from the monthly Planned Maintenance schedule where a Closure would affect all lanes in the same direction of I-69 entrance ramps, I-69 exit ramps, frontage roads or access roads, shall be coordinated with the Department a minimum of 28 days in advance. Developer shall comply with the following restrictions:

	Planned Maintenance Closure Restrictions
I-69 Mainline	Shall not take place on Event Days Shall take place only within Period B as defined on Table 3 in Exhibit 10 On I-69 Mainline Segments with 2 lanes in each direction at least one travel lane shall remain open and contraflow

	working shall not be permitted On I-69 Mainline Segments with 3 lanes in each direction at least two travel lanes shall remain open
I-69 entrance ramps and exit ramps	Shall not take place on Event Days Developer shall not close access to and from I-69 Mainline unless alternative access is provided
I-69 access roads and frontage roads	Shall not take place on Event Days
Cross roads	Shall not take place on Event Days No simultaneous work on more than one cross road within a Segment

Developer shall close any portion of the facility within the O&M Limits to the general public should circumstances either compromise the safety of the Project users or as necessary to protect the facility's assets. Regardless of the circumstances, Developer shall coordinate with the IFA, the Department, and other agencies that may be impacted by Closures. Developer shall maintain within the Operations Report a log of all Closures by time, location, and Segment as defined in Exhibit 10 of the Agreement. The report shall include the time log of the events, the cause of each Closure and/or Noncompliance Event, and the measures taken to achieve conformance.

Quarterly Unavailability Adjustment applicable to certain Closures is set forth in Exhibit 10 of the PPA. For any Closure during the Operating Period Developer shall prepare a Transportation Management Plan according to the requirements in Section 12.

18.3 Performance Requirements

In the MP, Developer shall set forth annually, for IFA approval, a Performance and Measurement Table which shall, except where indicated below, be consistent with Performance and Measurement Tables in Attachment 18-1.

The first such submittal of the Performance and Measurement Table shall be submitted in the MP. The Performance and Measurement Table shall set forth the following information:

Heading in Attachment 18-1 (Performance and Measurement Tables)	Contents of Developer's submitted Performance and Measurement Table
Element	As in Attachment 18-1
Element Category	As in Attachment 18-1
Performance Requirements	As in Attachment 18-1
Response to Defects	As in Attachment 18-1

Inspection and measurement method	Subject to proposed amendment by Developer as part of annual submittal of MP
Measurement record	Subject to proposed amendment by Developer as part of annual submittal of MP
Target	As in Attachment 18-1

In its annual submittals of the Performance and Measurement Table, Developer shall propose for IFA's approval any such amendments to the inspection and measurement methods and measurement records as are necessary to cause these to comply with Good Industry Practice and the Technical Provisions.

Developer's Performance and Measurement Table shall include the equipment manufacturer's recommended maintenance tasks at the manufacturer's recommended intervals, where applicable.

Within these Technical Provisions, reference to the Performance and Measurement Table means the latest approved version of the Performance and Measurement Table as included within Developer's MP. Failure to meet a Performance Requirement, whether through failure to meet the Target for any relevant measurement record, or for any other reason, shall be deemed to be a Defect. Whenever a Defect is identified, either by Developer's inspections, by IFA or by any third party, Developer shall act to remedy and repair the Defect as described in Section 18.5 and Attachment 18-1.

18.3.1.1 Roadway Surface Debris

Developer shall comply with the requirements of Attachment 18-1. Debris is defined as any object that is not normally intended to be on the roadway, which creates hazardous conditions for motorists, pedestrians, or other persons. Examples include but are not limited to pieces of wood; light fixtures; pipe; hardware; tires; tire debris; vehicle parts; hubcaps; boxes; crates; tools; ladders; animals; metal or any other materials; excessive water; or other objects that may cause motorists to brake, evade, or otherwise impact normal driving.

18.3.1.2 Roadway Condition – Rigid Pavement and Flexible Pavement

Refer to the IDM for definitions of the terms used within Attachment 18-1. The pavement shall meet the Performance Requirements for any pavement as specified in Attachment 18-1.

Roadway smoothness shall be measured for the entire continuous roadway surface within the O&M Limits.

18.3.1.3 Stormwater Drainage System Condition

The stormwater drainage system is defined as the bridge drainage system, side cross drains, roadside median ditches, outfall ditches, inlets, underdrains, and other piping to drainage collection areas. Developer shall comply with the Performance Requirements of Attachment 18-1.

18.3.1.4 Structures

Structures installed by Developer within the roadway and facilities O&M Limits includes bridges, retaining walls, sound walls, sign structures, drainage structures, sign structures, and lighting structures. All structures within the O&M limits shall meet Performance Requirements in Attachment 18-1.

18.3.1.5 Pavement Marking

Developer shall be responsible for the installation, retracing, and reinstatement of pavement markings, including all pavement markings required by the MUTCD at the time of the Work. All pavement marking lines shall be straight and true. Any tracking or splatter shall be corrected within five days after detection or after notice has been given. Performance Requirements shall be as specified in Attachment 18-1.

Developer shall be responsible for selecting the materials, material sources, types, properties, and all requirements for the materials that are used for the pavement markings. Pavement markings shall comply with the Project Standards.

18.3.1.6 Fixed Signs

Fixed signs are defined as any signs permanently installed by Developer within the O&M Limits. Performance Requirements shall be as specified in Attachment 18-1.

18.3.1.7 Highway Lighting

The lighting system within the O&M Limits shall meet the Performance Requirements of Attachment 18-1.

18.3.1.8 Incident Detection and Response Compliance

When Developer is made aware of an Incident within the O&M Limits by IFA, Department, or when Developer becomes aware of an Incident through its own forces Developer shall respond to Incidents and provide assistance to the Emergency Services and appropriate Governmental Entities to protect the safety of motorists and highway users, including response on short notice for Incidents such as accidents, highway spills, and other miscellaneous Incidents, and to remove and dispose of debris from the highway lanes and shoulders.

When Developer is made aware of an Incident within the O&M Limits, Developer shall be responsible for proceeding to the Incident site to secure the site and, as applicable, provide assistance as required. Developer shall take all action required to keep the travelling public, adjacent landowner(s), and Developer staff safe.

Developer shall detect and respond to all traffic- or roadway-related Incidents within the O&M Limits within the time period specified in Attachment 18-1. The time period shall commence when Developer becomes aware of an Incident and stops when Developer has initiated the appropriate response steps for the Incident, as detailed by the Incident response procedures. These steps include all required notifications, traffic, and facility control systems activations and the arrival on the scene of the Incident of appropriate equipment and personnel from Developer's field response team. Developer shall log and record the sequence of all actions taken in response to the Incident.

Noncompliance with this Incident detection and response policy will constitute a Category 1 Defect (Hazard Mitigation).

18.3.1.9 Winter Maintenance

18.3.1.9.1 General

This Performance Requirement covers the obligations for winter maintenance and establishes the level of service for snow and ice control for the Project.

All conditions that are considered to be causing a hazard are considered a Category 1 Defect (Hazard Mitigation) and shall be addressed immediately by Developer upon detection or upon being made informed of the condition(s). Developer shall be responsible to use available resources to assess weather conditions and make decisions and direct actions that maintain the roadway in as safe as possible a condition during winter events. Developer shall use the full complement of available resources to keep the roadway as safe as possible throughout the winter and to reach the prescribed level of service as soon as possible after winter events have abated or ceased.

Developer shall have available staff and equipment in a state of readiness one month prior to and one month after the median date for the first and last snowfall of 0.5 inches or more based upon past meteorological data and monitoring weather patterns. However, Developer shall be prepared to maintain the roadway at all times and under all weather conditions to the best of its ability and to prevent and to address any adverse conditions, regardless of the time of the year, using all available resources.

Developer shall monitor long-term forecasts to aid in deciding when equipment should be readied for unusually early and late storms, including those outside of the normal snowfall period.

Developer shall make every effort to minimize the amount of salt used on the bridges and roads. Developer shall use alternative substances or low salt (e.g., sand) as much as possible.

18.3.1.9.2 Snow and Ice Control Plan

Developer shall prepare and implement a Snow and Ice Control Plan that contains detailed operational procedures for performing the Snow and Ice Control work within the O&M Limits, as outlined herein for O&M During Construction and O&M After Construction. The SICP shall comply with all applicable Law, codes, and regulations governing the operation of snow removal equipment on public highways, best highway management practices, the Department's *Total Storm Management Manual*, and the requirements specified in this Section 18.3.1.9.

The SICP shall address the following:

- Advance preparation procedures
- Call-out procedures
- Response protocol
- Operational requirements
- Training
- Recordkeeping/Reporting
- Environmental management

- Anti-icing and de-icing chemical storage
- Equipment

Developer shall annually update and submit the SICP to IFA for its review and approval in its good faith discretion prior to July 30 each year, and shall incorporate any changes in strategy, equipment levels, etc., designed to rectify faults identified by Developer, and IFA in Developer's snow and ice removal operations during the preceding winter season.

18.3.1.9.3 Bare Pavement Event

Developer shall ensure that during the winter season all roadways within the O&M Limits are kept clear and safe. The Performance Requirement used to determine clear and safe is bare pavement. Bare pavement is defined as a condition under which the entire driving surface has been cleared of loose snow and ice. The driving surface may have isolated patches of ice, snow, or slush that, when treated with chemicals or abrasives or a combination of these, may be navigated safely by the average driver at a reduced speed.

Developer shall measure the percent of times bare pavement is achieved within the Target time after a storm as defined in Attachment 18-1. As a measure of Developer's performance in achieving this objective, Developer shall report bare pavement performance.

The storm event beginning date and time is the date and time that snow and, as applicable, freezing rain falling is first observed. The storm ending is the date and time that snow and, as applicable, freezing rain is observed to have stopped.

Bare pavement is considered lost on a roadway when snow or ice is covering the road surface and winter operations (plowing and, as applicable, spreading) are required. Record this date and time as the bare pavement lost date and time.

Bare pavement is considered regained when more than 95 percent of the portion of the roadway affected by the storm is bare.

There are three storm types: snow (S), freezing rain (FR), which includes hail, and both (B).

Drifting is not considered a storm, and therefore is not recorded as such. When drifting delays the time to regain bare pavement, this shall be noted as part of the data collection. Each storm shall be recorded as it happens, even if bare pavement is not regained before the start of the next storm. If precipitation begins again within three hours of the previous storm ending, it shall be considered to be the same storm.

The "bare pavement regained time" is "N/A" if the next storm begins within the performance Target time. For this event, the bare pavement regained time is recorded as the start time of the next event. This event shall not be used in determining performance.

Time shall be recorded using the 24-hour clock and rounded to the nearest half hour for the local time zone.

18.3.1.9.4 Reporting Requirements

Developer shall prepare a winter patrol diary that Developer completes, dates, and signs daily during the winter season and submits to IFA within 24 hours upon request. Developer shall

maintain a sufficient quantity of hardbound diaries for documenting the necessary information. Developer shall document daily information in the diary, which, at a minimum, includes the following:

- Weather condition
- Date
- Printed name and signature
- Work completed during the day and equipment and material used ({to include, but not limited to, salt, slurry, agricultural by-product, brine, mag chloride)
- When patrols are completed, areas patrolled, deficiencies noted
- Discussions with the public (name the individual)
- Discussions with IFA (name the individual)
- Equipment that cannot be operated at full capacity and why
- Calls from the police services and action taken
- Accident information
- Page number (e.g., page 1 of 2)

Developer shall complete the winter operations record or a report of a similar nature that shall record the following information for each winter vehicle:

- Date and time each winter vehicle is called for work
- Time operator arrived at the yard
- Time the winter vehicle is left at the yard
- Quantity of salt/liquid used
- Lane miles serviced
- Rate of application
- Total hours worked
- Unit number
- Page number (e.g., page 1 of 2)
- Comments
- Time drivers dismissed or relieved

Each daily entry shall be signed by the operator of the winter vehicle at the start of performing winter operations and at the end, when relieved. A printed name is also required to clearly identify the operator's name.

Developer shall collect the bare pavement data described in Section 18.3.1.9.3 and in the list below, and report its performance of achieving the Performance Requirements on a monthly basis. Data shall be reported in an electronic format. Developer shall submit the report of bare pavement data and performance on or before the close of business seven Days following each month's end for each month that has a winter maintenance event addressed by Section 18.3.1.9.

Developer shall collect and report the following information for each storm event as part of the monthly bare pavement report:

- Date and time event started
- Date and time event ended
- Date and time bare pavement was lost
- Date and time bare pavement was regained

- Type of event
- Bare pavement regained time is N/A (if applicable)
- Comments

18.3.1.9.5 Performance Requirements

Developer shall ensure that the work performed under this Section 18.3.1.9 meets or exceeds the Performance Requirements specified in Attachment 18-1.

18.3.1.10 Overweight Load Permits

Developer shall be responsible for analyzing overweight load permit applications from the Indiana Department of Revenue, Motor Carrier Services Division (MCSD). Refer to the Indiana Department of Revenue *Oversize/Overweight Vehicle Permitting Handbook* for a description of permit types.

Notification of an overweight load permit application will come from and response shall be returned to MCSD. Developer shall have seven days to analyze and respond to the overweight load permit request. Permit analysis shall be performed according to the AASHTO Manual for Bridge Evaluation.

18.3.1.11 Roadway Reopening Time Policy Compliance

For any Incident or Emergency within the Project Limits that requires Developer's action to reopen lane(s), Developer shall be required to reopen the lane(s) within the time period specified in Attachment 18-1, after Emergency Services has returned operational control to Developer.

Emergencies or Incidents within the Project Limits that require additional specialized equipment to be mobilized by Developer shall be exempt from the specified one hour period. Developer is not responsible for vehicle towing or recovery.

The response to Defects Hazard Mitigation period begins after the Incident is cleared and when applicable recovery efforts by others are completed. Section 3.5.7 of Exhibit 10 to the Agreement (Payment Mechanism) sets forth the circumstances in which failure to mitigate a hazard within the specified period is deemed to be an Unavailability Event.

18.4 Maintenance Requirements

Developer shall be responsible for performing maintenance and maintaining safe, reliable assets within the O&M Limits, with the main objectives to maximize safety, reliability, and roadway availability. Developer shall be responsible for maintenance of the assets within the O&M Limits.

Developer shall provide and maintain properly trained maintenance personnel of sufficient quantities to perform the maintenance activities identified in the Maintenance Manual. Developer shall also provide sufficient maintenance staff on-site for 24 hours per day, seven days per week, every day of the year. Maintenance personnel shall be available to respond to urgent maintenance issues as necessary to support the operational requirements of the segments.

18.4.1 Maintenance Plan

Developer shall draft and submit a Maintenance Plan (MP) to IFA for approval nine months prior to opening the O&M segments to the public. The MP shall conform to the maintenance-related aspects of the OMP requirements included in this Section 18. Developer shall prepare a MP that is consistent with the general maintenance obligations described in Section 18.1 and defines the process and procedures for the maintenance of the Project for the Term of the PPA. The MP shall include:

- Performance requirements, measurement procedures, and threshold values at which maintenance is required for each physical Element of the Project in accordance with this Section 18, including impacts to Related Transportation Facilities.
- Inspection procedures and frequencies, and subsequent maintenance to address noted deficiencies of the physical Elements shall also be included, in accordance with the requirements of Section 18.5.
- Response times to mitigate hazards, permanently remedy, and permanently repair Defects, which shall, at a minimum, be in accordance with the Performance and Measurement Table. Developer shall differentiate response times for Defects that require prompt attention due to immediate or imminent damage or deterioration, excluding those items which have no impact on any parties other than Developer, and response times for other Defects.

The MP shall be updated at least annually or more frequently, as necessary, to indicate the maintenance requirements for the equipment and systems as they are revised, upgraded, rehabilitated, and, as applicable, replaced. The MP shall cover the Operating Period throughout the O&M Limits.

The MP shall be a complete document that includes a brief description of the assets within the O&M Limits. In addition to the items listed above, the MP shall include the following minimum requirements:

1. Overview description of all assets within the O&M Limits, including facilities, systems, and equipment to be maintained by Developer.

2. A logical system breakdown of the assets within the O&M Limits, including facilities equipment and systems and the levels of maintenance to be provided by Developer's staff.

3. Description of the staffing plan and related workshop, maintenance garages, major equipment, vehicles, storage facilities, etc., as necessary to support the maintenance program.

4. List of the Project's major systems and equipment manufacturers/vendors, including their contact information (contact person, address, telephone numbers, website address).

5. List of O&M Contractors used to perform any maintenance activities and the identification of the services expected to be provided.

6. A list of preventive maintenance procedures.

7. Planned Maintenance schedule indicating the tasks and the required frequency.

8. A list of unplanned but anticipated maintenance activities.
9. Diagnostic procedures for equipment and systems.
10. Detailed preventive maintenance procedures.
11. Detailed reactive maintenance procedures.
12. Spare parts inventory procedures.
13. A list of spare parts inventory (on-site and off-site).
14. Repair procedures for repairs that are anticipated.
15. Systems and equipment manufacturer's operations and maintenance manuals.
16. Software manuals.
17. Wiring diagrams, schematic drawings, logic block diagrams, etc.
18. Assembly and disassembly drawings clearly identifying the components.
19. Copies of all inspection forms, checklists, etc.
20. Lane Closure plans.
21. Summary listing of all maintenance tasks categorized by system/discipline and the related maintenance classifications and Noncompliance Points.

Standard service manuals for commercially available equipment and products shall be acceptable only if the equipment provided is standard off-the-shelf equipment without any custom features or functions. Custom equipment and systems shall have custom operations and maintenance manuals that include detailed information that addresses the custom features of the equipment provided and shall include drawings. The non-applicable portions of standard manuals shall be neatly encircled and cross-hatched to clearly indicate that these sections are not applicable.

18.4.1.1 Maintenance Plans and Schedules

Developer shall update the MP including preparing maintenance plans and schedules in accordance with the requirements of this section. Developer shall prepare Planned Maintenance, Routine Maintenance, and Rehabilitation Work Schedules on an annual and monthly basis. The annual Planned Maintenance schedules shall be submitted to IFA for review and approval at least 90 days prior to the commencement of the year scheduled. Monthly Planned Maintenance and Routine Maintenance schedules, except for the first month of the year scheduled, shall be submitted to IFA for review and approval at least 30 days prior to the commencement of the month scheduled. The annual and monthly Planned Maintenance schedules shall describe, for each segment, all of the scheduled maintenance tasks or activities, and the dates, times, and durations of each, and the total quantity of Planned Maintenance hours.

During each year of the Operating Period, Developer shall incorporate into the MP all Planned Maintenance, Routine Maintenance and Rehabilitation Work. The MP shall be submitted to IFA for review and approval at least 90 days prior to the commencement of the planned calendar year. The MP shall describe, for each segment, all of the Rehabilitation Work activities planned,

and the dates and expected durations of each, as well as the total quantity of Planned Maintenance hours, subdivided into Routine Maintenance, Rehabilitation Work and any other activities requiring Planned Maintenance Closures. The MP shall address both the next calendar year and the next five calendar years. The one-year MP shall be a moving plan submitted every quarter and shall be updated to identify the Rehabilitation Work completed, the major maintenance work remaining, as well as any changes to the plan. A five-year plan shall be submitted annually and shall indicate the Rehabilitation Work activities planned over the next five calendar years. A Rehabilitation Work Schedule which shall conform to the requirements of Section 6.8 of the PPA shall be included in the MP.

18.4.1.2 Maintenance Work Report

The Maintenance Work Report shall identify all of the Planned Maintenance and Rehabilitation Work for the period, the actual Work performed for the period, and confirmation that the all Work performed was in compliance with the maintenance procedures. The Maintenance Work Report shall be submitted quarterly and shall be broken down for each month of the quarter.

Maintenance Work Report shall include the following data and information, at a minimum:

1. Summary of the Planned Maintenance and Rehabilitation Work for each month of the quarter.
2. Summary of the Planned Maintenance and Rehabilitation Work performed and completed for the month.
3. Summary of the Planned Maintenance and Rehabilitation Work that was not completed for the month. This report shall include reasons for the incompletion of the Planned Maintenance and a summary of deferred days for each deferred item.
4. Summary of the maintenance activities performed for the month beyond the Planned Maintenance and Rehabilitation Work, such as unplanned maintenance and repairs.
5. Detailed results of all Planned Maintenance and Rehabilitation Work and other maintenance work that was performed during the month.
6. Summary of Planned Maintenance Closures for the coming month. This report shall include details describing the location, duration, and reason of each.
7. Detailed results of all inspections, assessments, and testing activities, including the procedures, forms, etc.
8. Equipment Out-of-Service Report. This report shall list all traffic control and traffic surveillance, mechanical, and electrical equipment that was not functional at some time during the month and include data such as durations, reasons, and cross-references to any events or Incidents that may be related to the out-of-service equipment.
9. Quality assurance review of all maintenance personnel actions, lessons learned, etc.
10. Summary of staff and hours worked for the month.
11. A listing of all assets in the operation and maintenance program, including individual equipment and assets, with a summary of all of the maintenance activities performed during the month and the complete history of maintenance for the asset as reported by the CMMS.

18.4.1.3 Computerized Maintenance Management System

18.4.1.3.1 General Requirements

Developer shall provide the Developer Maintenance Management System (Developer MMS), which shall be fully operational prior to NTP2. Developer shall provide all necessary hardware, software, and personnel familiar with the use of such software until the expiration of the Term. Developer MMS shall be available for unrestricted remote electronic access and audit by IFA at all times throughout the Term. At least 30 days prior to NTP2, Developer shall demonstrate the functionality and use of the Developer MMS to IFA for approval. Proposed changes to Developer MMS system shall be demonstrated to IFA for approval before implementation.

The Developer MMS shall be updated as required to ensure compatibility with the computerized maintenance management system operated by the Department (the Department CMMS) and other Department operated systems as further described in Section 18.4.1.3.5 (Compatibility and Data Transfer to Department CMMS).

The Developer MMS shall be updated, maintained, and operational until expiration of the Term. Developer shall provide equipment, facilities and training necessary so that IFA staff are able to remotely access individual O&M Records and work activities, produce reports, and undertake audits. Developer shall provide all records contained in the Developer MMS to IFA upon expiration or earlier termination of the Agreement.

18.4.1.3.2 Asset Inventory and Condition Data Requirements

Developer shall create and maintain in the Developer MMS a complete asset database applicable to O&M During Construction and O&M After Construction, including inventory and condition details of all existing assets to be included in the O&M Work and all new and rehabilitated assets as they are constructed. Prior to NTP2, Developer shall cause all asset inventory and condition information recorded on the Developer MMS to be consistent with Baseline Asset Condition Report.

As the Construction Work progresses, Developer shall update the Developer MMS database in real time consistent with the Final Design and the Record Drawings to include:

- All Elements, components, assets, and equipment to be maintained; and
- A description of each item/equipment, with location, tag number, and equipment nameplate data (model number, serial number, size, etc.).

Developer shall identify and enter all assets and components of the Project into the Developer MMS with unique identifiers consistent with those descriptions and units of measure used by the Department.

18.4.1.3.3 Maintenance Activity and O&M Record Data Requirements

Developer shall update Developer MMS in real time for Defects and associated actions and for all other O&M Records, including records associated with O&M Work and inspections, no later than 7 days after completion of the activity. The Developer MMS shall contain a complete record of all maintenance activities associated with O&M During Construction and O&M After Construction, including:

- Preventive maintenance activities required;
- Preventive maintenance activities performed including patrols with dates and nature of work;
- Repair, replacement, and rehabilitation history of each asset;
- Day and time that equipment is taken out of service and the day and time it is returned to service;
- Information regarding the type of repairs or failures and identification of the O&M Work needing to be performed;
- For every Defect, the circumstances and action associated with the Defect, including the nature and timing of the scheduled repair;
- For every Defect, a record of whether it was assigned as a Category 1 Defect or Category 2 Defect, with reasons;
- For each discrete item of O&M Work, the location and nature of the work, the amount and type of materials used, and the categories and hours of labor employed; and
- All other O&M Records, including a record whenever an Element is inspected, maintained, modified, replaced, or removed.

18.4.1.3.4 Developer MMS Reporting Requirements

The Developer MMS shall be capable of reporting system performance on a geographical location basis to identify individual assets and Elements and demonstrate compliance with Developer's maintenance obligations and the Performance Requirements. Instantaneous customizable reports shall include, for each Element or assemblage of similar components:

- Condition measurements with reporting against each of the Elements in the Performance and Measurement Table identifying actual condition against Target;
- Historical inspection details;
- Maintenance activities performed, with details of labor, equipment, and materials used;
- Defects recorded and actions taken;
- Routine Maintenance and Rehabilitation Work activities scheduled;
- Details of Developer patrols with times and observations;
- Weather-related events and Developer response; and
- Any other information relevant to O&M Work.

18.4.1.3.5 Compatibility and Data Transfer to Department CMMS

Developer shall submit to IFA a daily electronic transmittal of all asset inventory and condition data and all maintenance activity and O&M Record data from the Developer MMS in a format compatible with the Department CMMS or any successor system that the Department may implement during the Term.

Developer shall provide reasonable assistance to IFA to ensure that data contained in the Department CMMS is consistent with data contained in Developer MMS.

18.4.1.3.6 Mandatory Spares

Developer shall determine the spares required to maximize the potential to receive the Maximum Availability Payment. Developer shall determine mandatory spares due to their custom nature and associated long-lead time.

18.4.1.4 Rehabilitation of Elements

Elements are subject to Rehabilitation Work requirements when any of the following conditions are evident:

1. Targets for individual Elements fall below 75 percent average compliance with the relevant Targets for each Element.
2. Individual Elements are in fair condition, but suggesting need for early replacement, rehabilitation or repair of individual Element and/or maintenance or operation improvement action to meet Performance Requirement.
3. The “reliability” is less than 99.9 percent for any safety critical Element. Such an Element is one that, should it fail, the safe operation of the Project would be in jeopardy or an immediate or imminent safety hazard would result.
4. The “reliability” is less than 90 percent Element other than a safety critical Element.
5. The Element ceases to function, or dies (as in the case of certain landscaping).
6. The frequency of repair is higher than that recommended in the manufacturer’s preventive maintenance schedule.

For the avoidance of doubt “reliability” is calculated as the in-service time over a prescribed time period. For example, if an Element is out of service for 20 days of 365 days, its “reliability” is 94.5 percent (i.e. (365 – 20)/365 x 100 percent). The reliability measurement is made over a moving 365 days.

18.5 Inspections

Developer shall have trained and competent personnel to plan and implement a program of inspections of the Project which:

- Verifies the continuing safety of the Project for Users.
- Prioritizes Defects requiring immediate and urgent attention because they are likely to create a danger or serious inconvenience to Users (Category 1 Defects).
- Identifies Category 2 Defects to be included for repair either within Developer’s annually recurring highway maintenance and repair program or as Rehabilitation Work.
- Is responsive to reports or complaints received from Customer Groups.
- Takes account of Incidents and Emergencies affecting the Project.
- Monitors the effects of extreme weather conditions.
- Collates data to monitor performance of the Project and to establish priorities for future maintenance operations and Rehabilitation Work.

Developer shall ensure that personnel performing inspections of road pavements and structures are certified as inspectors and/or raters, or otherwise appropriately qualified to perform the Inspections in accordance with the Technical Provisions and the Project Standards.

18.5.1 Inspection Frequencies

Developer shall establish inspection procedures and carry out inspections so that:

- All Category 1 Defects are identified and repaired such that the hazard to Users is mitigated within the period given in the column entitled “Category 1 Hazard Mitigation” in the Performance and Measurement Table.
- All Category 1 Defects are identified and permanently remedied within the period given in the column entitled “Category 1 Permanent Remedy” in the Performance and Measurement Table.
- All Category 2 Defects excluding those items which have no impact on any parties other than Developer are identified and permanently repaired within the period given in the column entitled “Category 2 Permanent Repair” in the Performance and Measurement Table.

The periods stated in the Performance and Measurement Table under each of the above headings shall be deemed to start upon the date Developer first obtained knowledge of, or first reasonably should have known of, the Defect. For this purpose Developer shall be deemed to first obtain knowledge of the failure not later than the date of delivery of the initial notice to Developer. Developer shall investigate reports and complaints on the condition of the Project received from all sources. Developer shall record these as O&M Records together with details of all relevant inspections and actions taken in respect of Defects, including temporary protective measures and repairs.

18.5.2 Inspection Standards

In performing inspections to identify Category 1 and Category 2 Defects, Developer shall, for any Element defined in the column entitled “Element” on the Performance and Measurement Table, conform at a minimum to the inspection standards set forth for that Element in the column entitled “Inspection and Measurement Method” on the Performance and Measurement Table.

18.5.3 General Inspections

Developer shall perform General Inspections in accordance with the MP so that the repairs of all Defects are included in planned programs of work.

O&M Records in respect of General Inspections shall include details of the manner of inspection (e.g., center lane closure or shoulder), the weather conditions and any other unusual features of the inspection.

General Inspections shall be performed such that Category 2 Defects are identified and repaired within the period shown in the Performance and Measurement Table or, if the Defect is not specified in the Performance and Measurement Table, within six months of the Defect occurring; provided that Defects which require special equipment to identify or are listed under the heading of Specialist Inspections in Section 18.5.4 may have different identification periods.

18.5.4 Specialist Inspections

Developer shall undertake Specialist Inspections for Elements listed in Table 18-1 and shall include the inspection results as O&M Records.

Table 18–1: Specialist Inspections

Element	Frequency
Roadway	Annual survey of pavement condition for the entire Facility, including main lanes, ramps, and frontage roads, undertaken using automated condition survey equipment to measure all necessary criteria including: ruts, skid resistance and ride quality according to the inspection and measurement methods set forth in the Performance and Measurement Table.
Bridges	Inspections and load rating calculations at the frequency specified in the Technical Provisions. In addition, NBIS inspections as per FHWA regulations and at the frequency specified in FHWA regulations.
Electrical supplies to lighting, signs, traffic signals and communications equipment	Inspections as required by FHWA or electrical regulations.
Karst features	Inspections shall be performed as required in the I-69 Section 5 Karst Monitoring and Maintenance Plan in Attachment 7-2 (Karst_Agreements).

18.5.5 Performance Inspections

Developer shall undertake Performance Inspections of randomly selected Performance Sections for audit purposes annually. Developer shall submit proposed Performance Sections to IFA for approval 90 days prior to anticipated Substantial Completion. On each occasion that a Performance Inspection is undertaken, it shall include at least five percent of the total available Performance Sections. Developer shall assess the condition of each Element of the Project, as set forth in the column entitled “Element” on the Performance and Measurement Table using the inspection and measurement method set forth in the column entitled “Inspection and Measurement Method”. Developer’s Performance Inspections shall include physical inspection of those Elements that are safely accessible without traffic control. Where the measurement method would require specialist equipment or would require traffic lane closures to implement, Developer shall assess the condition of the relevant Element by reference to the current O&M Records held in Developer’s database.

Developer shall create a new O&M Record for each Element physically inspected in accordance with the column entitled “Measurement Record” on the Performance and Measurement Table. Developer's Performance Inspections shall be undertaken to a schedule agreed with the IFA on Performance Sections randomly selected by the IFA. The IFA shall be given the opportunity by seven days notice, to accompany Developer when it undertakes the physical inspections associated with the Performance Inspection.

18.6 Reports and Records

In general, O&M Records shall be drafted or maintained by Developer, or, if applicable, its Contractors. The O&M Records and records shall adhere to the approved quality management system and shall, at a minimum, meet the following minimum requirements.

18.6.1 Reports

18.6.1.1 Quarterly Operations Report

Within the first 20 days of each quarter, beginning upon issuance of NTP 2 and continuing each quarter until the Termination Date, Developer shall deliver to IFA an Operations Report containing the information specified in this Section 18. Developer shall provide all other reports required by the PPA Documents to be submitted during construction and the Operating Period.

18.6.1.2 Maintenance Work Report

The Maintenance Work Report shall comply with the requirements of Section 18.4.1.3.

18.6.1.3 Rehabilitation Work Report

Developer shall comply with the requirements of Section 6.7.2 of the PPA.

18.6.1.4 Rehabilitation Work Schedule

Developer shall comply with the requirements of Section 6.8.1 of the PPA.

18.7 Copies

Developer shall issue one electronic copy and three hardcopies of each report to IFA.

18.7.1 Design

All documents related to Design Work and construction records required by the Technical Provisions shall be catalogued and indexed in both paper and searchable electronic formats for use by Developer in planning and executing the maintenance Work.

18.7.2 Operations and Maintenance Records

Developer shall maintain the following:

- The O&M Records, as well as any other records required under the public-private agreement (PPA) and as required in this Section 18.
- Complete records of Incidents that affect operation and maintenance of the O&M Limits.
- Complete records of all inspections, executed test and assessments, as well as results of all tests, assessments, and the results of those inspections.
- Details of all of the Rehabilitation Work executed.
- All data in relation to all original tests, graphics, and other records in relation to measurement equipment, certifications, and calibration records.
- Complete series of quarterly reports.
- Monthly records in relation to lane Closures on the O&M Limits.

LIST OF ATTACHMENTS

18-1: Performance and Measurement Tables

18-2: Not used

18-3: Baseline Asset Condition Report Framework

19 HANDBACK

19.1 General

Developer shall prepare a Handback Plan that contains the methodologies and activities that will be undertaken or employed to ensure that the Handback Requirements in the PPA are achieved at the end of the Term of the Agreement. Developer shall submit the Handback Plan, including a Residual Life Methodology plan, to IFA for review and approval at least 60 months before the anticipated expiration of the Term or earlier termination of the Agreement.

Developer shall perform all inspections and work necessary to meet or exceed the Residual Life requirements contained in Table 19-1 by the time of Handback of the Project to IFA.

Developer shall perform all Residual Life Inspections as and when required by the PPA Documents.

At the point of Handback, Developer shall certify that all physical Elements of the Project comply with the Residual Life requirements defined in the PPA.

For any Element of the Project for which a required final Residual Life is not specified in Table 19-1, the Element shall have a required final Residual Life equal to the documented serviceable life of the Element or five years, whichever is less.

19.2 Residual Life Methodology

Developer shall prepare and submit to IFA for approval a Residual Life Methodology, 60 months before the scheduled Handback. The inspection requirements and Residual Life Methodology requirements identified in Table 19-1 are minimum requirements. This submittal shall contain the evaluation and calculation criteria to be adopted for the calculation of the Residual Life at Handback of all Elements of the Project. The scope of any Residual Life testing shall be included, together with a list of all independent Residual Life testing organizations, proposed by Developer. These organizations shall be submitted to IFA for approval in its sole discretion, have third party quality certification, and be financially independent of Developer and not be an Affiliate.

IFA's approval of the Residual Life Methodology, including the scope and schedule of inspections, shall be required before commencement of Residual Life Inspections.

19.3 Residual Life Inspections

Inspections and testing shall be performed with appropriate coverage such that the results are representative of the whole O&M Limits within the Project as described in Table 19-1.

IFA shall be given the opportunity to witness any of the inspections and/or tests and shall be provided with a minimum of ten Business Days notice prior to the performance of any such inspections and/or tests. Developer shall deliver to IFA, within ten days after it is created, the output data arising from any testing and any interpretation thereof made by the testers.

In the event that Developer fails to undertake inspections within the relevant time periods described below, IFA shall be entitled to undertake or arrange the relevant inspections itself, following 30 days written notice to Developer.

19.3.1 First Inspection

Between 57 and 60 months before the end of the Term, Developer shall perform a Residual Life Inspection (the 'First Inspection'), including all Elements set forth in Table 19-1.

Within 30 days following performance of the First Inspection, Developer shall submit to IFA the findings of the inspection, including Residual Life test results, the report of the independent testing organization(s), Developer's Residual Life calculations and Developer's calculation of Residual Life at Handback for all Elements.

19.3.2 Second Inspection

Between 15 and 18 months before the end of the Term, Developer shall perform a second Residual Life Inspection (the 'Second Inspection') including all Elements set forth in Table 19-1.

The Second Inspection shall be performed for all Elements of the O&M Limits within the Project within the O&M Limits whether or not Developer has undertaken Rehabilitation Work for a particular Element in the period since the First Inspection.

Within 30 days following the performance of the Second Inspection, Developer shall submit to IFA the findings of the inspection, including Residual Life test results, the report of the independent testing organization(s), Developer's Residual Life calculations and Developer's calculation of Residual Life at Handback for all Elements of the O&M Limits within the Project.

19.3.3 Final Inspection

Not later than 90 days before the end of the Term, Developer shall perform a final Residual Life Inspection (the 'Final Inspection') including all Elements of the O&M Limits within the O&M Limits of the Project, whether or not Developer has undertaken Rehabilitation Work for a particular Element in the period since the First Inspection and Second Inspection.

Within 30 days following performance of the Final Inspection, Developer shall submit to IFA for review and approval the findings of the inspection, including Residual Life test results, the report of the independent testing organization(s), Developer's Residual Life calculations and Developer's calculation of Residual Life at Handback for all Elements of the Project.

19.4 Rehabilitation Work Schedule at Handback

The Rehabilitation Work Schedule for each of the five years before Handback shall include, in addition to any other requirements specified in the PPA Documents:

1. Developer's calculation of Residual Life for each Element calculated in accordance with the Residual Life Methodology and taking into account the results of the inspections set forth above.
2. The estimated cost of the Rehabilitation Work for each Element at the end of its Residual Life.

19.5 Residual Life and Useful Life Requirements

Where a Residual Life at Handback is specified in Table 19-1, the Residual Life at Handback shall be equal to or greater than the period set forth.

Where a Useful Life is specified in Table 19-1 in place of a Residual Life at Handback, the Useful Life created at the time of its last reconstruction, rehabilitation, restoration, renewal or replacement before the end of the Term shall be equal to or greater than the period set forth in the column entitled “Useful Life”, and the Rehabilitation Work Schedule shall estimate the cost of the next Rehabilitation Work (after the end of the Term) on the assumption that such Rehabilitation Work will be performed in order to create a new Useful Life of the same duration.

For the pavement:

1. Pavement Surface Condition – The pavement surface, including lanes and shoulders, shall be free of any evidence of structural weakness, pitting, potholes, ravelling, segregation, scaling, delamination, localized roughness and all other deficiencies. All cracks and joints shall be sealed with a sealant acceptable to the Department. The pavement surface shall be free and clear of dirt, sand and other debris.

2. Structural Requirements – At the time the Department assumes responsibility of the roadway, the structural capacity of each and every lane and shoulder of the roadway shall be such that a rehabilitation design for 10 years of traffic loading starting as of the date the Department assumes responsibility for the roadway will require no more than a 2-inch asphalt concrete overlay or equivalent treatment for the pavement type. The 10 year traffic loading will be determined based on traffic estimates at the time, but in no case will it exceed 30 million equivalent single axle loads for any lane of any section of roadway.

   Pavement strength testing to determine the structural capacity and the rehabilitation needed for the requirement above will be completed by an independent consultant retained and paid for by the Department and acceptable to both the Department and the Contractor. The Contractor shall be responsible for providing all traffic accommodation to allow pavement strength testing or other testing (either destructive or non-destructive), as required.

Table 19-1: Roadway and Bridges Asset Handback Criteria

Element Category	Element Description	Residual Life at Handback (Yrs)	Useful Life (Yrs)	Inspection Requirements	Residual Life Methodology (RLM) Requirement
1) ROADWAY					
	Pavement	10	-	Pavement inspections shall be undertaken by an independent consultant jointly approved by IFA and the Developer. Inspections shall provide a continuous or near-continuous record of Residual Life in each lane. Where the inspection method does not provide a continuous record of Residual Life, the number of valid measurements in each Performance Section shall be sufficient to give a statistically valid result. Inspections shall be repeatable to an agreed level of accuracy and inspection contracts shall include an agreed proportion of inspections to verify accuracy. Inspections shall include automated condition distress survey, ride quality, skid resistance, rutting and faulting.	RLM shall be capable of calculation of Residual Life for each 0.1 mile Performance Section. For a nominal 10 year Residual Life at Handback, 90% of Performance Sections shall have a Residual Life exceeding 10 years, and no Performance Section shall have a calculated Residual Life of less than 5 years.)
	Curbs and gutters	-	10	Inspections of all curbs and gutters shall be undertaken by personnel having adequate training on modes of failure, risk assessment and observational skills.	RLM shall draw on historical asset maintenance records, inspection and test histories for each Element.

Element Category	Element Description	Residual Life at Handback (Yrs)	Useful Life (Yrs)	Inspection Requirements	Residual Life Methodology (RLM) Requirement
2) NEW STRUCTURES					
	Reinforced concrete deck	-	15	Inspections of structures shall be undertaken by independent testing organizations. Inspections shall follow the latest inspection guidelines (as they apply at the relevant date that the testing is undertaken) recognized by IFA. A close examination shall be made of all parts of each structure. Non-destructive tests shall be undertaken appropriate to the type of structure. These shall include the measurement of structural deflection under calibrated load, the identification and measurement of de-lamination in bridge decks, the measurement of chloride and carbonation profiles from surface to reinforcement and/or tendon level, and the in-situ strength testing of concrete Elements. Testing of steel structures shall include the depth of corrosion and/or the measurement of remaining structural thickness for hidden and exposed parts. All lengths of weld shall be tested for cracking at key areas of structural steelwork (residual life first inspection only).	RLM shall: Draw on historical asset maintenance records, inspection and test histories for each structure. Take account of IFA and FHWA records of other structures on the network with similar characteristics. Include an assessment of load carrying capacity based on the original structural design calculations, the as built drawings and results of load deflection tests where appropriate. Take account of any trends in asset deterioration to determine the rate of deterioration and to predict the future condition of individual Elements and the entire structure.
	Pre-stressed concrete	40	-		
	Structural steelwork	40	-		
	Weathering steel	40	-		
	Corrugated steel	40	-		
	Corrosion Protection for structural steelwork	-	10		
	Deck wearing surface	-	10		
	Deck joints	-	5		
	Bearings	-	30		
	Barrier railings	40	-		
	Reinforced concrete substructure	40	-		
	Sign/signal gantries (structural Elements)	15	-		
	Retaining Walls	40	-		
	Sound Barriers	40	-		
	Traffic signal poles	-	10		
	High mast lighting poles	-	15		

Element Category	Element Description	Residual Life at Handback (Yrs)	Useful Life (Yrs)	Inspection Requirements	Residual Life Methodology (RLM) Requirement
3) REHABILITATED/MODIFIED STRUCTURES					
	Reinforced concrete deck	-	15	Inspections of structures shall be undertaken by independent testing organizations. Inspections shall follow the latest inspection guidelines (as they apply at the relevant date that the testing is undertaken) recognized by IFA. A close examination shall be made of all parts of each structure. Non-destructive tests shall be undertaken appropriate to the type of structure. These shall include the measurement of structural deflection under calibrated load, the identification and measurement of de-lamination in bridge decks, the measurement of chloride and carbonation profiles from surface to reinforcement and/or tendon level, and the in-situ strength testing of concrete Elements. Testing of steel structures shall include the depth of corrosion and/or the measurement of remaining structural thickness for hidden and exposed parts. All lengths of weld shall be tested for cracking at key areas of structural steelwork (residual life first inspection only).	RLM shall: Draw on historical asset maintenance records, inspection and test histories for each structure. Take account of IFA and FHWA records of other structures on the network with similar characteristics. Include an assessment of load carrying capacity based on the original structural design calculations, the as built drawings and results of load deflection tests where appropriate. Take account of any trends in asset deterioration to determine the rate of deterioration and to predict the future condition of individual Elements and the entire structure.
	Pre-stressed concrete	15	-		
	Structural steelwork	15	-		
	Weathering steel	15	-		
	Corrugated steel	15	-		
	Corrosion Protection for structural steelwork	-	10		
	Deck wearing surface	-	10		
	Deck joints	-	5		
	Bearings	-	15		
	Barrier railings	15	-		

Element Category	Element Description	Residual Life at Handback (Yrs)	Useful Life (Yrs)	Inspection Requirements	Residual Life Methodology (RLM) Requirement
	Reinforced concrete substructure	15	-		
4) DRAINAGE					
	Underground storm sewer systems	40	-	Inspection of storm sewer systems shall include closed circuit TV inspection of all buried pipe work. Groundwater level monitoring at selected locations will be required to provide assurance through the RLM of a 10 year Residual Life for groundwater interceptor drains.	RLM shall draw on historical asset maintenance records, inspection and test histories for each Element of the drainage system. Developer shall include a methodology to determine the Residual Life of filter drains designed to intercept groundwater.
	Culverts	40	-		
	Ditches	-	10		
	Inlets	25	-		
	Outfalls	-	10		
5) TRAFFIC AND SAFETY					
	Guardrail	-	10	Inspections of all traffic and safety items shall be undertaken by personnel having adequate training on modes of failure, risk assessment and observational skills.	RLM shall draw on historical asset maintenance records, inspection and test histories for each traffic and safety Element.
	Concrete barrier	-	20		
	Attenuators	-	20		
	Overhead signs	-	5		
	Roadside traffic signs	-	5		
	Traffic signal housings & mountings	-	8		
	Pavement markings	-	3		
	Delineators	-	5		

Element Category	Element Description	Residual Life at Handback (Yrs)	Useful Life (Yrs)	Inspection Requirements	Residual Life Methodology (RLM) Requirement
6) ELECTRICAL					
	Luminaires	-	5	Inspections of all electrical items shall be undertaken by personnel having adequate training on modes of failure, risk assessment and observational skills.	RLM shall draw on historical asset maintenance records, inspection and test histories for each electrical Element.
7) ANCILLARY					
	Earthwork slopes	50	-	For embankment and cut slopes a risk based inspection procedure shall be adopted following Good Industry Practice. Deformation monitoring will be required to provide assurance through the RLM of a 50-year Residual Life.	RLM shall draw on historical asset maintenance records, inspection and test histories for each ancillary Element.
	Lighting poles	-	10	Inspections of all traffic and safety items shall be undertaken by personnel having adequate training on modes of failure, risk assessment and observational skills.	
	Fences	-	10		
	Manhole covers, gratings, frames and boxes	50	-		

20 DELIVERABLES

Developer shall submit the deliverables listed in Table 20-1. The table describes certain deliverables specified in the Technical Provisions, but is not intended to be inclusive of all deliverables required in the Technical Provisions, Standard Specifications, Project Standards or other references and guidelines. See the referenced sections for detailed submittal requirements. Unless otherwise indicated, all deliverables shall be submitted in both electronic format and hardcopy format. Acceptable electronic formats include current versions of Microsoft Word, Microsoft Excel, or Adobe Acrobat (PDF) files, unless otherwise indicated. Drawings shall be submitted electronically in the current versions of the original MicroStation format and in PDF format.

Timeframes for the review types are specified in Section 3.1.2 of the PPA unless noted otherwise.

Table 20-1: Deliverables

Deliverable	Submittal Schedule	Reference Section
Project Baseline Schedule	90 days after NTP1	1.5.2.1.1
Project Status Schedule	Monthly (7th of the month)	1.5.2.1.2
Progress Report	Monthly	1.5.2.1.3
As-Built Schedule	30 days after Final Acceptance	1.5.2.1.4
Project Management Plan	See Attachment 1-1	1.5.2.5
Quality Management Plan (QMP)	See Attachment 1-1	2.1
Design Quality Management Plan (DQMP)	See Attachment 1-1	3.1
Construction Quality Management Plan (CQMP)	See Attachment 1-1	4.1
Environmental Compliance and Mitigation Plan	Within 30 days of NTP1	7.3
Public Involvement Plan	Within 30 working days of NTP1	6.5.1
Community Outreach Plan	See Attachment 1-1	6.3
Safety Plan	Within 90 days of NTP1	6.5.6
Incident Management Plan		6.5.6
Emergency Plan	Within 60 days of NTP1	6.5.6
Hazardous Materials Management Plan	Two weeks prior to the initiation of construction work	7.9.1
Spill Prevention Plan	See Attachment 1-1	7.9.1
Sustainability Management Plan	See Attachment 1-1	7.11
Operations and Maintenance Plan	See Attachment 1-1	18.1.5
O&M Safety Plan	See Attachment 1-1	18.1.7
O&M Quality Plan	See Attachment 1-1	18.1.8

Deliverable	Submittal Schedule	Reference Section
Durability Plan	See Attachment 1-1	2.1.4
Plan for digital RFC plans (if applicable)	Prior to Construction Work	2.2.4.4
Contractor/consultant qualifications and pre-qualifications	Prior to Work performed by Contractors/consultants	2.2.5
Design Unit Report	Within 30 days of NTP1	3.3
Notice of scheduled Design Reviews	At least one week prior to any Design Review	3.5
Design Review Plan and Schedule	Within 45 days of NTP1	3.7
Stage 1 Design	By Developer	3.9.1
Stage 2 Design (as-needed)	By Developer	3.9.2
Released-for-Construction (RFC) Design	By Developer	3.9.3
Working drawings	By Developer	3.10
Final Design	By Developer	3.9.4
Design check report	Within seven days of each design check	3.12.2.1
Record Drawings	Prior to Final Acceptance	3.12.2.2
Requests for design Deviations or design exceptions (as applicable)	No later than Stage 1 Design Review	3.13
Design Workshop draft schedule and agenda	Prior to Design Workshop	3.16
Design Workshop documentation	Prior to commencement of Design Work	3.16
Design Monitoring Report	Monthly	3.18.2
Progress Report	Monthly	3.18.3
Special Provisions	With applicable Design Reviews	3.19.4
Results of QC testing	Upon completion of each QC test	4.5
Construction Work Activity Schedule	By 12:00 (noon) on Friday of each week during Construction Work	4.9
Construction documentation	See Section 4.10	4.10
Sources of supply of fabricated and prestressed/precast structural members and copies of documentation	As soon as it is known, but no less than 30 days prior to delivery to the Project	4.11
Material certifications	Upon receipt from Suppliers	4.11
Certificate of compliance	Prior to Final Acceptance	4.11

Deliverable	Submittal Schedule	Reference Section
Aesthetics and Enhancement Implementation Plan	With Stage 1 Design	5.3.1
Soil Preparation Memorandum	Prior to beginning soil preparation, planting, or seeding.	5.5.1.2
Soil Reports	Prior to submittal of the Nutrient Management Plan	5.6.2
Noxious Weed Control Plan	Prior to the commencement of eradication or removal work	5.6.3
Nutrient Management Plan	With RFC Documents	5.6.1
Public contact records	Monthly	6.5.5
Construction Progress Photographs	Monthly – starting one month after the beginning of construction	6.5.9
Environmental Compliance and Mitigation Plan (ECMP)	Within 60 days of NTP1	7.3
Governmental Approvals and modifications		7.4.1
Forest Mitigation Plan	With Stage 1 Design	7.5.2
Hazardous Materials Management Plan	Submit with ECMP	7.9.1
Sustainability Management Plan	Submit with ECMP	7.11
Draft Concept Drainage Report	Within 60 days of NTP1	8.2.2
Final Concept Drainage Report	21 days prior to Stage 1 Plan submittal	8.2.2
Roadway design calculations	Submit with Stage 1 Design	9.5.1
Preliminary Pavement Design Report	With Stage 1 Design	10.3.2
Final Pavement Design Report	Prior to Release for Construction submittal	10.3.2
Signing Roll Plans	Submit with Stage 1 Plans	11.5.1.1
Signing Plans	Submit with RFC Documents	11.5.1.2
Justification of add, delete or modification of signs	Submit with RFC Documents	11.5.2
Signing Database	90 days prior to Substantial Completion	11.5.3
Regulatory Sign Study	90 days prior to Final Acceptance90	11.5.4
Signal Warrants	Submit with Stage 1 Plans	11.6.1
Lighting Roll plans	Submit with Stage 1 Plans	11.7.2

Deliverable	Submittal Schedule	Reference Section
Traffic Control Device Request	Submit with RFC Documents	11.9.2
Transportation Management Plan (TMP) for Construction Work and O&M During Construction	Draft TMP within 30 Days after Financial Close; Final TMP 30 days prior to Commencement of Construction; Updates as needed.	12.3.1
TMP for O&M After Construction	Draft TMP within 90 days before Substantial Completion; Final TMP within 30 days before Substantial Completion; Updates as needed.	12.3.1
Temporary Traffic Control Plan (TTCP)	7 days prior to work covered in that specific Design Unit	12.3.2
Access and Mobility Plan	90 days after NTP1	12.4.3
Subsurface Exploration and Testing Program	Prior to performing subsurface exploration and testing	13.3.1.2
Geotechnical Planning Reports	Prior to RFC documents	13.3.1.4
Interim Design Memoranda	With Stage 1 Design review submissions	13.3.3
Final geotechnical reports	Prior to releasing constructed elements for subsequent Work	13.3.4
Blasting Plan	45 days prior to blasting	13.4.3
WEAP analysis	30 working days prior to driving piles	13.4.4.2
Deep Foundation Testing and Monitoring Programs	30 days before constructing deep foundations	13.4.4.2
Configuration for pile load tests	30 working days prior to driving load-test piles	13.4.4.2
Qualifications for each drilled shaft inspector	30 working days prior to drilled shaft installation	13.4.4.3
Complete driving records	Prior to beginning the placement of reinforcing steel around piles, and prior to backfilling around piles	13.4.4.4
Qualifications for each pile driving inspector	30 days prior to pile driving	13.4.4.5

Deliverable	Submittal Schedule	Reference Section
Source and material properties of all fills proposed for use	Prior to construction	13.4.6
Vibration Monitoring Plan	60 days prior to construction work	13.4.12
Instrumentation report	30 days prior to installing instrumentation	13.4.12
Construction Instrumentation monitoring reports	Prior to opening the instrumented Work	13.4.12
Developer Utility Agreements	Prior to Utility Adjustment Work associated with the Utility	15.1.5, 15.3.1
Utility Adjustment Plans	Prior to Utility Adjustment Work associated with the Utility	15.1.5, 15.3.1
Protection Plan	Concurrent with Stage 1 design	15.1.11
Utility Correspondence	Within seven days of receipt or sending, as applicable	15.2
Utility Record Drawings	In accordance with Project Record Drawing submittal schedule	15.4.2
Utility Damage Report (blank form)	Prior to Construction Work	15.5.3
Utility Damage Report	Within two days of damage to a Utility.	15.5.3
Utility Adjustment Master Plan	Within 30 days after NTP1; and subsequent monthly updates thereafter	15.5.4
Railroad Design Costs	Prior to establishment of Railroad Agreements	15.6.5
Railroad Records and Correspondence	As completed	15.6.6
Draft Railroad Agreements	Prior to establishment of final Railroad Agreement	15.7.2
Final Railroad Agreements	Prior to Work affecting railroads	15.7.2
Railroad Insurance Policies	Prior to entry by Developer upon railroad property	15.7.6
Railroad Construction Cost Reports	Monthly	15.8.2
Baseline Asset Condition Report (BACR)	30 days prior to NTP 2	18.1.11

Deliverable	Submittal Schedule	Reference Section
Operations Report	Quarterly beginning at NTP 2 and continuing until the Termination Date.	18.2.2
Maintenance Plan	Nine months prior to opening the O&M segments to the general public	18.4.1
Snow and Ice Control Plan	Prior to July 30 each year	18.3.1.9.2
Maintenance Work Report	Quarterly during the Operating Period	18.4.1.2
Rehabilitation Work Report	See PPA Section 6.7.2	18.6.1.3
Rehabilitation Work Schedule	See PPA Section 6.8.1	18.6.1.4
Bare Pavement Data	Monthly, after each month that has a winter maintenance event.	18.3.1.9.4
Handback Plan	60 months prior to the Termination Date of the Operating Period	19.1

21 APPLICABLE STANDARDS

21.1 Introduction

Developer shall design and construct the Work in accordance with the relevant requirements of the Project Standards listed in Table 21-1. In some instances, only specific sections of the referenced standard apply, as specified in these Technical Provisions. Section 1.2.3.6 of the PPA provides requirements regarding irreconcilable conflicts, ambiguities or inconsistencies among the Project Standards.

In accordance with PPA Sections 5.2.5, 5.2.6 and 5.2.7, Developer shall use the most current version of each standard or reference listed in Table 21-1 as of the Setting Date, unless expressly stated otherwise in the PPA Documents.

Any standards, manuals and guidelines that are not included within the definition of Project Standards shall be approved by IFA prior to use by Developer. Any manuals or documents other than those reflected herein or elsewhere in the PPA Documents require IFA's prior approval before use in the Work. Developer shall obtain advance prior written approval from IFA for any Deviation from the Project Standards, in addition to complying with any other requirements regarding requested Deviations set forth in the PPA Documents.

Developer shall be responsible to communicate with the applicable Utility Owner to determine the applicable Adjustment Standards for any Adjustment Work.

21.2 Modifications to Department Standards

The following notes apply to the Department standards used on this Project:

1. Certain standards have been created as internal guidance documents and not as mandatory requirements. However, for purposes of this Project, all provisions of standards, including the figures and tables, are mandatory, and guidelines are to be applied as requirements. All words such as "should," "may," "must," "might," "could," and "can" shall mean "shall" unless the context requires otherwise, as determined in the sole discretion of IFA. Developer shall disregard qualifying words such as "usually," "normally," and "generally." In accordance with Section 1.2 of the PPA, it shall be in IFA's sole discretion to determine when the context does not require a provision to be mandatory.
2. In accordance with Sections 5.2.6 and 5.2.7 of the PPA, if the Department standard expires during the course of the Project, Developer shall contact IFA to determine if they should continue to use the standard or if it will be replaced.
3. When a reference to "Engineer" relates to design responsibilities or other technical issues, "the Engineer" shall mean Developer's Lead Engineer. When a reference to "Engineer" relates to administrative issues, "the Engineer" shall mean the Department. It shall be in the Department's sole discretion to determine when the context refers to technical or administrative responsibilities.
4. All references related to pay items or quantities, measurement for payment, method of measurement, basis of payment, extra work, contract adjustments, adjustment of unit prices, or similar phrases shall be disregarded by Developer.

5. References to “additional work,” “adjustment to compensation,” “extra work,” “pay extra,” “at the expenses to the Department,” or similar phrases shall be disregarded. Payment of the Milestone Payments, Availability Payments, and adjustments thereto as more fully described in Article 10 of the PPA will be full compensation for all Work performed pursuant to the Contract Documents unless specific provisions for additional payments are contained in the Contract Documents.
6. No changes have been made to provisions in any standards that do not apply to this Project, but that provide general information (e.g., descriptions of Department divisions and their duties, descriptions of legal authority, or descriptions of internal Department procedures); however, in some cases it may not be clear whether rights or responsibilities are applicable to Developer. In accordance with Sections 1.2 and 5.2.5 of the PPA, if it is unclear whether specific provisions in the standards are applicable to Developer, Developer shall notify IFA and IFA shall make that determination in its sole discretion.
7. The Developer shall disregard the paragraphs within the standards relating to questions. All questions shall be taken to IFA.
8. All responsibilities assigned to the Department shall be assigned to Developer unless otherwise indicated in the PPA Documents.
9. When a standard refers to an action being necessary or needed, Developer shall construe the action as required, unless the context requires otherwise, as determined in the sole discretion of IFA.
10. Phrases relating to items such as activity[ies] that “will be” conducted, that are “most easily accomplished by”, that “are recommended”, that are “desired”, that “is usually necessary”, that “should preferably be” done, that “might require”, that “is necessary” or “as necessary”, that “are” (or “is”) “required” or “done” shall be construed to be mandatory requirements unless the context requires otherwise, as determined in the sole discretion of IFA. Phrases relating to problems with activity[ies] that should not be conducted, such as “is not normally used,” “is not good practice,” “should never be done,” “cannot be used,” or “should be avoided” shall be construed as prohibited. It shall be in IFAs sole discretion to determine when the context either requires or does not require a provision to be mandatory.
11. Where the notes refer to items that are indicated in the plans or special provisions or required in the plans or special provisions, the plans or special provisions shall mean the Developer’s plans or special provisions.
12. References to approved products or materials shall mean such products or materials approved by IFA or the Department.
13. All references to the Contractor, the Inspector, the Project Engineer, the Engineer, the State Materials Engineer, District Construction Engineer, the Survey Crew, the Field Crew, the Project Supervisor, the Certified Aggregate Technician, and other certified technicians shall mean Developer, unless noted otherwise.
14. All references to the Department facilities, including the Office of Materials Management Laboratory, Cement Laboratory, Asphalt Binder Laboratory, Steel Laboratory, Aggregate Laboratory, Soil Laboratory, Asphalt Mix Laboratory, Material Services Section Laboratory, and the Laboratory shall mean Developer’s similar Laboratory facilities, unless noted otherwise.

15. Developer shall use forms as required to report the same information and in the same format as the Department forms shown in the standards.
16. References to Department practices and policies shall be construed to be mandatory requirements unless the context requires otherwise. It shall be in IFA's sole discretion to determine when the context does not require a provision to be mandatory.
17. All references to Department offices and personnel shall mean Developer's similar offices and personnel.
18. If Developer believes that an item in the standards is unclear, Developer shall notify IFA. Regardless of whether Developer notifies IFA, IFA shall always have the right to notify Developer if Developer is interpreting the requirement incorrectly.
19. All references to "you" or "your" shall mean Developer unless otherwise directed by IFA.
20. When a standard refers to items that will be performed or provided by the Department or by a division or employee of the Department, Developer shall construe the requirements as applying to Developer unless otherwise specified in the Contract Documents, or unless the context requires otherwise. It shall be in IFA's sole discretion to determine when the context requires otherwise.
21. The following sections of Standard Specification Section 100 – General Provisions are deleted: Sections 102, 103.04, 103.05, 103.07, 104, 105.02, 105.05, 105.06, 105.07, 105.13, 105.15, 105.14, 106, 107.02, 107.03, 107.04, 107.05, 107.09, 107.17, 107.18, 107.19, 107.20, 107.21, 107.22, 107.23, 107.24, 107.25, 108.02, 108.03, 108.05, 108.07, 108.08, 108.09, 108.10, 108.11, 108.12, 109, 110, 111, and 113.
22. Section 108.01 of the Standard Specifications is revised to read: "The subcontractor shall be in accordance with the requirements of 105 IAC 11-2-10, Subcontractors."
23. The following sections of Indiana Design Manual Chapter 52 – Pavement and Underdrain Design Elements shall not apply to Work within the O&M Limits: 52-6.0 Pavement-Surface Distresses, 52-7.0 Pavement Design Coordination, 52-9.02(05) Asphalt-Pavement Rehabilitation, 52-9.03(01) PCCP Rehabilitation, and 52-11.0 Preventative Maintenance including Figure 52-11A HMA PM TREATMENTS and Figure 52-11B PCCP PM TREATMENTS.

21.3 List of Standards

Table 21-1: Standards and References

Availability Legend:
E: Document to be provided to Developer in electronic format, see Attachment 21-1.
IS: Industry standard, Developer's responsibility to acquire.
W: Standard available online at Author/Agency's website, Developer's responsibility to acquire.

Author/Agency	Title	Availability
INDOT	Standard Specifications	W
INDOT	Recurring Special Provisions & Plan Details	W
INDOT	INDOT Standard Drawings	W

Author/Agency	Title	Availability
INDOT	Design Manual (IDM) including Design Memoranda and excluding Chapter 502	W
INDOT	Design Manual (IDM) Chapter 502, Traffic Design (Draft)	E
INDOT	Geotechnical Design Memoranda	W
INDOT	Approved Materials List	W
INDOT	Indiana Manual on Uniform Traffic Control Devices (IMUTCD)	W
INDOT	Traffic Management Strategic Deployment Plan	W
INDOT	Work Zone Safety Mobility Policy	W
INDOT	Professional Services Contract Administration Manual	W
INDOT	Construction Memorandums	W
INDOT	Geotechnical Manual	W
INDOT	Public Involvement Policies and Procedures Manual	W
INDOT	Total Storm Management Manual	W
INDOT	Utility Procedures and Accommodation Policy	W
INDOT	Utility Facility Relocations On Construction Contracts (105 IAC 13)	W
INDOT	Interstate Highways Lane Closure Policy	W
INDOT	Bridge Inspection Manual	W
INDOT	Manual for Frequency of Sampling and Testing and Basis for Use of Materials	W
INDOT	Traffic Noise Analysis Procedure	W
INDOT	Real Estate Manuals	W
INDOT	Right-of-Way Engineering Manual, and Revisions	W
AASHTO	T88, T194 and T289	IS
AASHTO	A Guide for Transportation Landscape and Environmental Design	IS
AASHTO	Guide for the Planning, Design, and Operation of Pedestrian Facilities	IS
AASHTO	Guide for the Development of Bicycle Facilities	IS
AASHTO	A Guide for Achieving Flexibility in Highway Design	IS
AASHTO	A Policy on Geometric Design of Highways and Streets	IS
AASHTO	Roadside Design Guide	IS
AASHTO	Highway Safety Design and Operations Guide	IS
AASHTO	Roadway Lighting Design Guide	IS

Author/Agency	Title	Availability
AASHTO	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals	IS
AASHTO	An Informational Guide for Roadway Lighting	IS
AASHTO	Standard Specifications for Transportation Materials and Methods of Sampling and Testing	IS
AASHTO	Guide Specifications for Structural Design of Sound Barriers	IS
AASHTO	LRFD Bridge Design Specifications	IS
AASHTO	Standard Specifications for Highway Bridges	IS
AASHTO	Manual for Bridge Evaluation	IS
AASHTO	Guide Design Specifications for Bridge Temporary Works	IS
AASHTO	LRFD Bridge Construction Specifications	IS
AASHTO	Bridge Security Guidelines	IS
AASHTO	Manual on Subsurface Investigations	IS
AASHTO/AWS	D1.5M/D1.5:2010 Bridge Welding Code	IS
FHWA	Flexibility in Highway Design	W
FHWA	Code of Federal Regulations, Title 23 (Highways), Chapter 1, Part 752 Landscape and Roadside Development	W
FHWA	Geotechnical Engineering Circular No. 5: Evaluation of Soil and Rock Properties	W
FHWA	Manual on Uniform Traffic Control Devices (MUTCD)	W
FHWA	Standard Highway Signs Book	W
FHWA	Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volume I & II	IS
FHWA	Alternative Intersection/Interchanges: Informational Report (AIIR) FHWA – HRT-09-060	W
FHWA	Roadway Lighting Handbook	W
FHWA	Geotechnical Engineering Circular No. 7: Soil Nail Walls	W
FHWA	Geotechnical Engineering Circular No. 4: Ground Anchors and Anchored Systems	W
FHWA	FHWA-NHI-05-046, Earth Retaining Structures	IS
FHWA	FHWA-HI-99-007, Rock Slopes	IS
FHWA	FHWA-NHI-01-023, Shallow Foundations	IS
FHWA	FHWA/NHI 10-016-IF-99-025 Drilled Shafts: Construction Procedures and LRFD Design Methods Manual	IS

Author/Agency	Title	Availability
FHWA	Technical Manual for Design and Construction of Road Tunnels – Civil Elements, Report No. FHWA – NHI-10-034	W
FHWA	Program Guide Utility Relocation and Accommodation	W
FHWA	Highway Performance Monitoring System (HPMS) Field Manual	W
ADA	Americans with Disabilities Act Accessibility Guidelines	IS
ANSI A300 (Part 1)	Tree Care Operations – Tree, Shrub and Other Woody Plant Maintenance – Standard Practices	IS
ANSI A300 (Part 2)	Tree Care Operations – Tree, Shrub and Other Woody Plant Maintenance – Standard Practices – Part 2 – Fertilization	IS
ANSI A300 (Part 3)	Tree Care Operations – Tree, Shrub and Other Woody Plant – Standard Practices – Part 3 – Tree Support Systems	IS
ANSI Z60.1	American Standard for Nursery Stock	IS
ANSI Z133.1	Safety Requirements for Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and for Cutting Brush	IS
ANSI/IESNA RP-8-00	American National Standard Practice for Roadway Lighting	IS
ASTM	Annual Books of Standards	IS
Hortus Third	A Concise Dictionary of Plants Cultivated in the United States and Canada (L. H. Bailey Hortorium, 1976)	IS
IDEM	Indiana Storm Water Quality Manual	W
IDNR	Indiana Drainage Handbook	W
IDNR	Guidelines for the Hydrologic-Hydraulic Assessment of Floodplains in Indiana	W
IEEE	National Electric Safety Code	IS
IES	Roadway Lighting Handbook, RP-8, Addendum: “Designing the Lighting System – Using Roadway Lighting”	IS
IES	DG-5-94, Recommended Lighting for Walkways and Class 1 Bikeways	IS
IES	RP-19-01, Roadway Sign Lighting	IS
IES	RP-8-00, American National Standards for Roadway Lighting	IS
IGGA	Guide Specification - Next Generation Concrete Surface (NGCS) Construction on Newly Constructed Roadways	W
ITE	Manual of Transportation Engineering Studies	IS

Author/Agency	Title	Availability
ITE	Traffic Engineering Handbook	IS
ITE	Preemption of Traffic Signals Near Railroad Crossings: An ITE Recommended Practice	IS
NCHRP	NCHRP Report 480, A Guide to Best Practices for Achieving Context Sensitive Solutions	IS
NCHRP	Report 350. Recommended Procedures for the Safety Performance Evaluation of Highway Features	IS
NCHRP	Report 672, Roundabouts: An Informational Guide, Second Edition	IS
NEMA	National Electrical Manufacturer Association	IS
NFPA	National Electric Code	IS
NFPA	National Electric Safety Code	IS
NFPA	502-Standard for Road Tunnels, Bridges and Other Limited Access Highways	IS
TRB	Highway Capacity Manual	IS
TRB	NCHRP Report 529, Guideline and Recommended Standard for Geofoam Application in Highway Embankments	IS
Bellcore	Technical Advisories and Technical Requirements	IS
AREMA	Manual For Railway Engineering	IS
CSX	Bridge and Track Design Criteria, Specifications, and Standard Drawings	W
PCI	Bridge Design Manual Volume I & II	IS
CRSI	Concrete Reinforcing Steel Institute Manual of Standard Practice	IS

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