



OHIO DEPARTMENT OF TRANSPORTATION

CENTRAL OFFICE • 1980 WEST BROAD STREET • COLUMBUS, OH 43223
JOHN R. KASICH, GOVERNOR • JERRY WRAY, DIRECTOR

6/24/2015

Project 150395 **Addendum No. 2**
PID No. 84868
FRA – IR 71 – 5.29
Major Reconstruction
Letting: July 16, 2015

Notice to all Bidders and Suppliers to please be advised of the attached Proposal Addendum.

The Department utilizes Bid Express (<http://www.bidx.com>) as the official medium for electronic bid submittal. All bidders must prepare bids and submit them online via Bid Express.

Addenda amendments must be acknowledged in the miscellaneous section of the Expedite (EBS) file and all amendments loaded in order for your bid to be considered for award of this project. Bid express will not accept bids that do not have amendments incorporated. Failure to incorporate changed quantities or items in your Expedite (EBS) submissions will result in the rejection of your bid.

**Proposal Addendum
For
FRA-71-5.29; PID 84868
Project 150395**

Please be advised of the following:

Replace the Special Provision – 3D/4D Models with the attached dated 6-23-2015.

SPECIAL PROVISION

3D / 4D Modeling

FOR

CRS: FRA-71-5.29

PID: 84868

DATED: 06-23-2015

SPECIAL PROVISION - 3D/4D MODELS

SPECIAL PROVISION - 3D/4D MODELS

DEFINITIONS

3D Model – A digital virtual model that contains representations of physical objects in 3 dimensions (x, y, and z coordinate locations based on the project datum), as surfaces or solids, of the Project utilized to show the existing surfaces and required completed surfaces of the construction project.

3D Elevations – Proposed surface coordinates depicted within the 3D Model showing roadway profile, pavement grade breaks, proposed finish pavement surfaces elevations, pavement cross slopes, edge of pavement location, finish earthwork elevations (including surface and slopes) and Utility Spot Locates, except when any such location is noted for exclusion. This definition includes northing, easting, and elevations of such points (x,y,z).

4D Model – An aggregation of virtual models and tabular information, correlating to the Critical Path Method (CPM) Progress Schedule, depicting the construction sequencing, phasing and magnitude of the work for the construction of the project. The 4D model is a combination of P6 Primavera information, tabular information, and visuals created through the use of and manipulation of the 3D Model. The purpose of the 4D Model is to show visual representation of the plan baseline schedule. The 4D Model is not required to be integrated or automated into the 3D Model.

Utility Spot Locates – A physical survey performed by the Contractor of any utilities exposed during construction, or any other project specific survey spot locate requested by the Engineer for inclusion within the As Built Model.

SCOPE

The Department is providing a 3D Model as part of the Bid Documents and Contract Documents. The 3D Model will be in multiple files and will include a Project Index Document describing the differing aspects of the 3D Model.

Any reference within this note to proposed 3D Elevations shall apply to roadway profile grades, pavement grade breaks, finish pavement surfaces elevations, pavement cross slopes, edge of pavement location, and finish earthwork elevations (including surface and slopes).

The 3D Model contractually depicts the 3D Elevations of existing surfaces and depicts the 3D Elevations of finished surfaces. The 3D model contractually depicts the proposed 3D Elevations of roadway profile grades, pavement grade breaks, finish pavement surfaces elevations, pavement cross slopes, edge of pavement location, and finish earthwork elevations (including surface and slopes) of the project (unless areas within the 3D Model are specifically excluded). The 3D Model contains surfaces and line grade strings in Land xml format.

The 3D Model depicts areas which are to be excluded from immediate use by the Contractor. These areas will need fine graded and field adjusted to meet conditions. The Department will not guarantee the accuracy of 3D Elevations which are depicted for exclusion. These areas are denoted by cross-hatching within the digital 3D Model. This will be further detailed within the Project Index Document provided with the 3D Model.

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The Department and Contractor shall utilize this 3D Model in determination of proposed 3D elevations during the construction of the Project. The 3D Model shall not govern any other contract quantities.

The 3D Model shall govern when differences between information depicted within the 3D Model and the plan finished grades depicted within the Plans are noted. Any Department made changes to the model after award shall be provided in the same format as the original 3D Model. Any changes made by the Department to the model will be addressed per ODOT's Construction and Material Specifications (CMS) 104.02 and shall have equivalent standing as a revision of a Plan Sheet.

The Contractor may use the 3D Model to present, visualize, and depict any known or unknown constructability issues on the Project.

The Contractor shall perform Utility Spot Locates by field surveying any exposed active utilities discovered during construction. The field surveys shall be performed on the same standards and datum as the 3D Model. This will be performed on a Unit Cost basis.

The Contractor shall maintain and submit an As-Built 3D Model to the Department. The As-Built 3D Model shall be a transmittal of all Utility Spot Locates, and if applicable, a digital 3D Model.

The Contractor shall maintain a digital 3D Model to depict as-built conditions which vary significantly from the Department's supplied 3D Model. An As-Built 3D Model shall be maintained and submitted by the Contractor when earthwork construction tolerances are found outside of C&MS 203.08B, 203.08C or 203.08D. The Engineer may direct up to 10 verification spot surveys if the tolerances, as judged by the Engineer, appears to exceed the limits as defined in 203.08B, 203.08C or 203.08D. The costs of these verification spot surveys shall be included in the cost of the As-Built 3D Model. If the Engineer directed verification spot surveys demonstrate a digital As-Built 3D Model may be required, the Contractor shall survey the area to determine the limits of the area exceeding the tolerances at no additional cost. This information shall be included within a digital As-Built 3D Model.

As part of the As-Built 3D Model submittal requirements, all Utility Spot Locates shall be organized and submitted, clearly noting all Utility Spot Locates with well-defined Northings, Eastings, Elevations and descriptions in an ASCII file format. The digital As-Built 3D Model shall be in Land xml format.

The As-Built 3D Model information shall be submitted to the Department with a sealed letter from a Professional Surveyor or Professional Engineer certifying the information provided within the As-Built 3D Model is correct and accurate to the best of his/her knowledge. The digital As-Built 3D Model, if applicable, shall be of equal accuracy, quality and value of the original 3D Model. The Professional Surveyor or Engineer must have active participation in the As-Built 3D Model's creation and implementation.

MODEL MANAGEMENT PLAN

The Contractor shall designate a CADD/Model Manager(s) for the Project. (The role may be fulfilled by more than a single individual). The CADD/Model Manager(s) shall manage all modeling associated with the Project, and serve as the point of contact for all modeling activities. The Model Manager(s) shall

SPECIAL PROVISION - 3D/4D MODELS

have thorough knowledge and understanding of the of required 3D modeling and 4D schedule simulation.

The Contractor shall prepare and maintain a model management plan that contains:

- Resume of the Model Manager
- Strategy for 4D model creation and 3D model maintenance.
- Software, including CADD, 3D modeling, 4D modeling, and CPM scheduling.
- Management plan for keeping models current with milestone submittals.
- 3D Grade Control Software to be used on excavators, dozers, scrapers, etc.
- Quality Control and Quality Assurance process for auditing change management of 3D models.
- Roles and responsibilities of the Contractor’s modeling team.

If replacement to the Model Manager is required, the replacement Model Manager must have equal or better experience of the original Model Manager.

The Model Management Plan shall be submitted and accepted within 60 days of Project execution.

The Contractor and Department shall hold a post construction meeting to discuss the functionality, benefits, needed information (provided or not provided), potential improvements, and lessons learned from the 3D/4D Implementation into the project. This meeting may be held and discussed in conjunction with the Post Construction meeting.

The cost of the Model Management Plan and duties of the Model Manager shall be included with the As-Built 3D Model.

DEPARTMENT – SUPPLIED DATA

ODOT operates internally using MicroStation and GEOPAK only. Therefore, all CADD related documentation, supporting files, and customization provided by ODOT shall be MicroStation/GEOPAK based only. Section 504 of the CADD Engineering Standards Manual provides information regarding CADD file requirements.

The Department will make available the data listed in Table 1. The Contractor shall be responsible for verifying any data used for the project.

Table 1 – Department Supplied Data

3D Model Contract Documents - Information Type
ASCII Files (Horizontal and Vertical Alignments, Survey Control Points (.csv)
Land XML Files (Horizontal and Vertical Alignments, Existing and Proposed 3D Surfaces)
Coordinate Geometry Database (GEOPAK)
Existing and Proposed Triangle Models (GEOPAK)
CADD Basemaps – Existing and Proposed roadway, ROW, Profiles, GEOPAK cross section cells, MOT phasing, etc.

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4D MODELING – Baseline Phasing Visualization

The Contractor shall utilize the provided 3D Model and create a 4D Model to reflect the scheduled CPM Baseline construction activities. The 4D Model shall show phased visualization as time-related depictions (estimated dates and estimated durations clearly associated with CPM Schedule's P6 Activity IDs) of earthwork quantities to be placed, anticipated pavement location and quantities to be placed, and MOT phasing showing traffic locations with anticipated lane width and location. The 4D Model will be used by the Department to evaluate the baseline Schedule and to evaluate phasing constructability corresponding to the P6 Schedule.

A 4D Model must contain one or more virtual models and depict the Major CPM Schedule Activities (as defined below) within the CPM baseline schedule. This includes information describing durations, volume, and quantities for the required depicted work. Specific Major CPM Schedule Activities within the CPM schedule shall be relatable to a specific object or grouping of objects within the virtual model(s) provided by the Contractor. The 4D Model shall clearly define and label any deviations from the project plan's Maintenance of Traffic scheme. The 4D model shall show the phasing intent of the project in a tabular and visual format combination (utilizing the modified 3D model).

The 4D Model is a combination of P6 Primavera information, virtual models created by manipulation of the 3D Model, and tabular quantity information. A 4D Model must contain one or more virtual models depicting each of the Major CPM Schedule activities (as defined below).

Specific activities within the CPM schedule will then be related to a specific object or grouping of objects depicting work within the virtual model(s). The 4D model shall show the phasing intent of the project in a graphical, visual, and tabular format combinations (utilizing virtual model(s)).

The Contractor is not required to generate or extract construction documents (plans) from the provided 3D Model to support the 4D Modeling and schedule simulation activities. The 4D Model is not required to be integrated or automated into the 3D Model nor the P6 schedule. The contractor is required to use the 3D Model to create virtual models depicting Major Baseline CPM Schedule activities and must be digitally created within or by usage of the provided 3D Model.

Major Baseline CPM Schedule Activities (in regards to 4D Modeling) to be depicted shall be:

- Each major MOT Traffic Phase with the locations of traffic
- Visual Earthwork locations and tabular quantities of Embankment and Excavation within the MOT Phase(s)
- Visual depiction of Pavement placement phasing (Asphalt: 304 Base, Asphalt Base, Intermediate, and Surface Asphalt. Concrete: 305 Base, and finished Concrete Pavement) and a tabular Pavement placement quantity within the major MOT Traffic Phases

Each of the MOT Traffic Phases shall be considered a 4D Model Component, and the Earthwork and Pavement placement items shall be considered a Subcomponents. 3D Model visualizations do not need to depict volumetric accuracy and can be provided in simple visual shapes within the 3D Model.

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Any Digital 3D Models developed to support the 4D model shall be in Bentley Microstation dgn format, Land xml, or .dwg format.

The 4D Models shall be submitted within 14 days of CPM Baseline schedule acceptance. The progress schedule baseline submission shall follow the requirements of Proposal Note 107 for review and approval. The 4D Model will accurately show and match the CPM baseline schedule for the overall plan to complete the Major CPM Schedule Activities.

The Contractor shall work closely with the Department to refine the requirements of the 4D Model submissions to ensure the end product meets the needs of the Department. The Department expects a minimum of two iterations before the end product satisfies requirements, but reserves the right to request additional iterations if the note’s intent is not fulfilled.

The Contractor shall submit one clear, organized hard copy and PDF report to the Department detailing the 4D Model. The report must include the organized baseline CPM schedule’s depicted activities along with one or more visualizations depicting each Major CPM Schedule Activities and 4D Components and Subcomponents, as stated above, with overall work location(s). Visualizations for each Major CPM Schedule Activity, at minimum, shall include traffic locations, earthwork locations, and applicable pavement placement phasing. Earthwork and pavement quantities from the 3D Model, estimated dates and durations, and estimated production rates shall be identified in a tabular format for each visualization.

All electronic information files shall be made accessible to the Department by the Contractor to be viewed along with the report. A minimum of one meeting will be held between the Department and the Contractor to discuss the details of the 4D Model submission.

Pay Items:

<u>ITEM</u>	<u>UNIT</u>	<u>DESCRIPTION</u>
690E98400	LS	Special – Misc.: As-Built 3D Model
690E98000	EACH	Special – Misc.: Utility Spot Locates
690E98400	LS	Special – Misc.: 4D Baseline Model