PROJECT OVERVIEW

State has programmed the construction of Trunk Highway (TH) 169 through the city of Elk River, MN as State Project (SP) 7106-87. The project extends from just south of the TH 101/TH10/TH 169 Interchange to 201st Avenue NW. The project will reconstruct the pavement and replace the existing at-grade traffic signal systems at Main Street, School Street, 193rd Avenue and 197th Avenue with grade-separated interchanges.

Project goals include:
- Replacing aging infrastructure
- Improving safety by eliminating traffic signals at high-crash-cost locations
- Improving mobility by converting TH 169 to a freeway section and using auxiliary lanes between interchanges
- Improving community cohesiveness by raising or lowering the grade on TH 169 and connecting neighborhoods and businesses on both sides of the corridor

The project includes four separate components: mainline grading and drainage; interchanges at Main Street, School Street, 193rd Avenue and 197th Avenue; replace the northbound TH 169 bridge #71002 over TH 10; and reconfigure access to and from TH 10 and TH 169 to eliminate crossovers and traffic signals.

State will deliver this project through the Construction Manager/General Contractor (CMGC) delivery method. Contractor will be part of a collaborative project delivery team consisting of State, Contractor, Preliminary and Final Bridge Designer(s), CMGC, Independent Cost Estimator (ICE), Engineer’s Estimator (EE) and other stakeholders. While the CMGC’s input will serve to reduce changes and inefficiencies during construction, responsibility for the Construction Plans and Specifications (i.e. Engineer of Record) for the final road plans will remain with Contractor and not with the CMGC.

General design components for this contract include, but are not limited to:

Roadway Design
- All pavement and roadway design for any roadway segment shown on the proposed layouts
- Bridge approach panels
- Any local street construction required by the proposed layouts
- Guardrail, impact attenuators and other safety barriers
- Final hydraulics, erosion control and Stormwater Pollution Prevention Plan (SWPPP) design
- Permit exhibits for Department of Natural Resources (DNR) and Corps of Engineers (COE) permits
- Americans with Disabilities Act (ADA)

Bridge Design
- Replacement of existing Bridge #71002 with new Bridge #71020 on TH 169 Northbound (NB) over TH 10
- New Bridge #71018 at the interchange of 197th Avenue and TH 169
Geotechnical/Retaining Walls

- Geotechnical recommendations for all retaining walls
- Retaining wall design including Visual Quality components as outlined in the Visual Quality Manual for wall finishes
- Ground improvements (if applicable)

Material Design Recommendation (MDR)

- Includes all necessary soils borings for roadway and drainage segments

Traffic

- Traffic control plans and staging plans (developed in collaboration with State and CMGC contractor)
- New permanent signing (C, D, and overhead) for all geometric changes
- Traffic control signal system for the intersections of interchanges as shown on the layout
- Highway lighting for areas in the layouts
- Striping
- Intelligent Transportation System (ITS)

1.0 PROJECT MANAGEMENT (Source Type 1010)

1.1 Project Administration

State will provide a Project Director to help manage the project. It will be the responsibility of the State’s Project Director to receive the work produced by the Contractor, review the work for compliance with contract requirements, and to recommend payment for such work. Contractor will utilize the State’s ProjectWise TH 169 project directory for project file sharing. Project directory standards and file naming standards are available upon request to the State’s Project Director. Administration includes communication with State, coordination with the Project Design Team (PDT), invoicing, supplemental agreements, cost and schedule updates, billing preparation, and other non-technical work.

1.2 Schedule Management

State anticipates that the CMGC will provide a Critical Path Method (CPM) schedule for the construction of the project. Contractor’s task will be to coordinate the design schedule with the construction schedule in order to meet the proposed project completion date(s). This may include dividing the overall TH 169 Project into separate work packages. If separate work packages are required, a contract amendment will be executed.

Working in coordination with the Preliminary and Final Bridge Designers, Contractor will assist in developing a draft critical-path Project Design Schedule for delivery of recommendations and design plans. State anticipates that the Project Design Schedule will require periodic updating and management by the Contractor.

1.3 Project Design Team (PDT)

State has established the PDT that will include:

- Project Director (Darren Nelson - State District 3)
- Assistant Project Manager (Claudia Dumont - State District 3)
- Project Design Manager (Tom Highum - State District 3)
- Project Construction Manager (Tim Paul - State District 3)
State will schedule weekly progress meetings during the design phase for the PDT that will be held at the MnDOT Office in St. Cloud, Minnesota. The Contractor’s Lead Project Manager, Roadway and Bridge Design Oversight Managers (DOMs) and State’s Project Director will lead these meetings. Contractor will coordinate meetings and agenda items with other project stakeholders as necessary. Contractors’ design team will attend these meetings as needed via video or teleconference (Anticipate 50 PDT meetings of 3 hours duration).

Contractor will maintain a log of design related issues and meet with the State’s Project Director and DOMs on a weekly basis to discuss action items and resolved issues. (Anticipate 50 meetings of 1 hour duration for key personnel).

1.4. Design Team Kick-Off Meeting (at MnDOT, St. Cloud MN)
Contractor will schedule and facilitate a design kick-off meeting to establish communication protocol for the design, discuss known project issues, and review the project schedule. Contractor will receive available project information from State, including the most up-to-date preliminary design information. At the kick-off meeting Contractor will provide its Quality Management Plan (QMP) to State. Note: Contractor must submit its list of meeting attendees to State’s Project Director five days prior to the meeting. (4 hour duration).

1.5. Comprehensive Project Team Kick-off Meeting (at MnDOT, St. Cloud MN)
This meeting is intended to be the kick-off for the overall project team when the following parties are under contract: Contractor, Bridge Designer(s), ICE, EE and the CMGC. State will lead this meeting. The anticipated meeting date is in April 2020. The goal of the meeting will be to review project information submitted to date, review the CMGC process, schedule, and to review an outline for project risk assessment procedures. State anticipates that CMGC process refinements will occur as a result of this meeting. (8 hour duration).

1.6. Railroad Coordination
Contractor will attend coordination meetings with the railroad. Minimal railroad coordination is anticipated, as only TH 169 widening will occur under the railroad bridge, and not total reconstruction. (Anticipate 6 meetings of 3 hours duration, in St. Cloud)
1.7. **Additional Project Meetings (as necessary)**

Additional project meetings are anticipated to be required with CMGC, and other stakeholders. Contractor’s Lead Project Manager and other Key Personnel will be expected to collaborate with State. *(Anticipate 30 additional project meetings of 4 hour durations for up to 4 personnel per meeting).*

1.8. **Contractor’s Key Personnel**

Contractor’s key personnel required to work on this contract include:

- Lead Project Manager
- Road Design Oversight Manager
- Bridge Design Oversight Manager
- Lead Geotechnical Engineer
- Lead Structural Wall Designer
- Lead Traffic Engineer
- Lead Hydraulics Engineer
- Quality Assurance (QA) Manager

These key personnel will be required to attend PDT meetings in St. Cloud as needed.

1.9. **Quality Management Plan (QMP) and Quality Assurance/Quality Control Procedures** *(Source Type 1250)*

Contractor will develop a QMP that specifies how Contractor will perform Quality Assurance (QA) and Quality Control (QC) activities throughout the duration of the project to ensure delivery of a quality product in a timely manner that conforms to established contract requirements. Contractor will prepare the QMP and distribute it to all project team members, including subcontractors.

Contractor’s Quality Assurance Manager will have the responsibility of reviewing submittals, prior to submittal, to ensure compliance with the MnDOT Quality Management Process (QMP). The basic format for quality certification will be checking, back checking, and verifying format in accordance with MnDOT’s Design-Bid-Build Quality Management Process. Refer to [http://www.dot.state.mn.us/design/qmp/index.html](http://www.dot.state.mn.us/design/qmp/index.html) for further information.

Contractor’s QA Manager will review the entire plan design and production process to ensure the completeness and adequacy of their work and conformance with Contractor’s QA procedures.

No changes in Contractor’s Key Personnel may be made without prior written consent of the State’s Project Director. State will notify Contractor immediately if there are changes to State’s project management or lead design personnel.

1.10. **Deliverables**

**State’s Deliverables:**

1. Review and respond to submittals.
2. Coordinate internal reviews.
3. Provide copies of project correspondences and project information.
4. Approve deliverables.
5. Monitor quality control.
6. File naming convention guidance and file directory structure guidance.

**Contractor’s Deliverables:**

1. Schedule and attend meetings.
2. Weekly update meeting or conference call with State’s Project Director.
3. Prepare meeting agendas and minutes.
4. Prepare and submit monthly progress and status reports.
5. Maintain project schedule, and provide updates to the State’s Project Director during weekly conference calls.
6. Provide timely copies of critical correspondences and project issue data.
7. Provide Quality Assurance / Quality Control on project deliverables and submit project QA/QC certification.

2.0 UTILITY COORDINATION (Source Code 1195)
Utility coordination will include tasks necessary to be in compliance with MnDOT’s Utility Accommodation & Coordination Manual and applicable State Statutes. This includes but is not limited to Gopher State-One Call contacts and preparing and distributing letters and plans, meetings and individual utility contacts.

A Subsurface Utility Engineering (SUE) contract is already in place with T2 Utility Engineers and it can be assumed that the Utility Coordination Process will be completed through Utility Coordination Step 3: Review of Information from Utility Owners.

Contactor will be responsible for Utility Coordination beginning at Step 4: Utility Design Meeting thru Step 9: Review of Utility Relocation Plans, Schedule and Permit Submittal. State will be responsible for Steps 10 - 14.

2.1 Deliverables
State’s Deliverables:
1. Subsurface Utility Engineering (SUE) information plans, tabulations, and potholing data

Contractor’s Deliverables:
1. Gophers State One call documentation.
2. Coordination Letters and attachments.
4. One Utility Coordination Meeting agendas, materials and minutes.
5. Phone log documentation.
6. Project Manager utility certification.
7. Meeting minutes.

3.0 DETAIL DESIGN PLANS (SOURCE CODE 1250)
This task includes development of final detailed design plan(s) for the project. Contractor will be required to provide work using MicroStation Corridor Modeler. The final road plans will also be consistent with any findings and recommendations identified in the Project Documentation and in accordance with Federal and State laws, rules, and regulations.

It can be anticipated that due to the phased staging required to maintain traffic flow and the extensive utility impacts and/or relocations that will be required, multiple work packages may be required for this project. For proposal purposes, anticipate 4 work packages will be required.

The final design will incorporate the elements of the project’s Visual Quality Manual (VQM) being developed as part of the preliminary bridge design contract. It is anticipated that the VQM will be complete in spring 2020.

3.1 Construction Plans
The Construction Plan set will consist of, but is not limited to, the following sheets, and not necessarily in the order listed below:

a) Title Sheet
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- Contains the location map, signature block, sheet index, project data, station equations, traffic data, and station-reference point comparison.

b) General Layout (1"=200 Ft)
- A layout of the project showing the plan sheet layout and sheet numbers for reference.

c) Statement of Estimated Quantities (SEQ)
- Tabulation showing MnDOT’s standard pay item numbers, item descriptions, and quantity of materials needed to complete the project. Columns will exist for referencing the individual item’s tabulation. Notes will be included where necessary for clarification. The SEQ will require separation of quantities by funding source type. Contractor will ensure that pay items are consistent with the State’s Trns*port pay item list.

d) Soils and Construction Notes and Standard Plates
- Notes covering special requirements and critical information contained in the Materials Design Recommendation will be listed as well as any other special construction requirements and District-provided notes that have been identified. MnDOT Standard Plates used on this project will also be listed on this sheet. MnDOT will provide this information. Contractor will review.

e) Typical Sections
- Typical sectional views of the existing and proposed roadway will be shown for the length of the project. The sections will be consistent with the Materials Design Recommendation and the Environmental Documentation. Surface type, cross slopes, material types will be shown.

f) Quantity Charts (Tabulations)
- Detailed quantity breakdown by station or station range of most items contained in the Statement of Estimate Quantities (SEQ). Tabulations will separate or note different funding sources.

g) Public Utility Tabulations
- Detailed breakdown of existing utilities located within the project limits. This tabulation is required to have the following columns: Station, Location, Inplace Facility Description, Owner, Remarks, and Adjust, Relocate, or Leave As Is.

h) Miscellaneous Details
- Any details necessary for the construction of unique or non-standard elements identified during detail design.

i) Standard Plan Sheets
- MnDOT Standard Plan Sheets will be included as needed to supplement the construction details in the plan. The State will provide electronic copies of any District-Modified Standard Plan Sheets.

j) ADA Details and Construction Limits
1. The person who is responsible for leading the curb ramp, sidewalk and driveway design for the project must have attended MnDOT’s Consultant ADA Training or have comparable experience approved by the State’s Project Manager and must be directly involved with the design of the project.
2. A field walk with the designer will be conducted with the State’s Project Manager prior to the start of any design.
3. Contractor will meet with State ADA staff after completion of the 30% and 60% plans. These meetings will be held in St. Paul. ADA construction limits will be determined based on the 30% plan.
4. All pay items including utility adjustments will be tabulated by quadrant and if radial domes are intended to be used at a quadrant the radius will be given in addition to quantity. Follow pay item guidance provided in MnDOT’s ADA Project Design Guide when determining which pay items to use on the project.
5. Contractor will complete and submit the ADA plan checklists to the ADA office.

k) Road Connection and Entrance Details
- Detailed plan layouts and charts showing grades, radii, widths, cross slope and construction details.
l) Construction Plan Sheets (1”=100Ft.)
   Detailed plans of the project; providing information on the location of items such as roadways, shoulders, guardrail layout, radii, turn lanes, acceleration lanes, driveways, curb and gutter, accessible sidewalks and curb ramps, tapers, right-of-way, railroad property, easements, obliterations, station equations, fencing, etc.

m) Earthwork tabulations
   Earthwork volumes will be shown on separate tabulation sheets, and developed for each stage of construction.

n) Profile sheets (with existing and proposed utility crossing shown)

o) Concrete Paving Layout

p) Superelevation Plans (1” = 100 Ft)
   Prepare a detailed superelevation plan that patterns the superelevation transition, showing cross-slopes where superelevation transition begins and ends and where the superelevation is zero.

q) Removal Sheets
   o Detailed plans of the project providing information on the location of removal of pavement, drainage, etc. included on the Construction Plan Sheets.

r) Drainage and Erosion Control / SWPPP Plans – see Task 5

s) Traffic Control Plan – see Task 4

t) Striping Plan – see Task 4

u) Signing Plan – see Task 4

v) Signal Plans - see Task 4

w) ITS Plans - see Task 4

x) Alignment Plan and tabulation for the entire project.

y) Cross-Section Sheets including a match line layout sheet
   o Cross-Section Sheets for the entire project. Prepare cross-sections as needed to show drainage and special features. Cross sections will include existing ground line, proposed roadway template, grading grade, existing and proposed utilities, existing and proposed culverts, existing and proposed right-of-way, temporary easements, entrance slopes, subgrade corrections, unsuitable soil removal, rock lines and topsoil placement.

3.2 Plan Format
The format of the Road/Construction Plans will comply with the State’s current design concepts and practices. Plan Sheets must have sheet specific legends. Sheets contained in the Road/Construction Plans and cross-sections will be submitted to MnDOT in MicroStation Version 8i or other version as approved by the State Project Manager. The Plan will be in compliance with the MnDOT CADD Standards Manual.

Electronic Project design information will be in MicroStation and Geopak format. Upon completion of this Project or Termination of this contract, the electronic project files become the property of the State of Minnesota, Department of Transportation and will be submitted on a CD-ROM or portable USB device.

Plans submitted for reviews will be delivered in a PDF format. The final design plan shall be submitted on 11”x17” bond and only the title sheets will be on an 11” x 17” sheet of vellum. Plan review meetings will be held at the MnDOT District Three Offices in St. Cloud at the 60% and 90% plan reviews.

3.3 Plan Review and Approval
All submittals will be in a single .pdf format and the State will use the .pdf electronic redlining process to insure all State comments are consolidated into a single set of comments. The Contractor will respond electronically to each State comment electronically either agreeing to the change, commenting on the change, or disagreeing with the change and stating why for further discussion.
The Road/Construction Plan will be submitted for review and approval at the following stages of development. State will provide a checklist of items to be included at each submittal.

a) **Construction Limits Verification**  
Contractor will combine provided Staff Approved Layouts and DOM, verify the construction limits and provide one final set to the State’s Project Manager. This task includes resolving any conflicting or overlapping areas. These construction limits will be the final right of way limits for any property acquisition.

b) **Preliminary Design (30% Complete)**  
Contractor will prepare a set of 30% plans per MnDOT’s Plan Check List.  

In addition, Contractor will be required to submit an Excel spreadsheet that includes all Pay Items and Estimated Quantities for review and cost estimating purposes. It is understood that estimated quantities will be subject to change with each submittal, but additional effort will be required to provide accurate estimated quantities for all pay items with each submittal, including the initial 30% Plan stage.

- Prior to submittal of the construction limits and plans, the Contractor will perform enhanced internal quality control review process (QA/QC review) of design components, including a Discipline Coordination Review meeting. Scan and electronically file documentation of quality control checks and resolutions including 30% Review Checklist and Functional Group Review (FGR) Independent Technical Review (ITR)/Independent Constructability (ICR) Review Forms.

- The State’s District staff will complete review and comment on this submittal 20 working days after the submittal date. The State will provide a single set of consolidated comments in a PDF format. If necessary, Contractor will revise and re-submit corrected construction limits and send a PDF of the responses to the State’s review comments.

c) **Intermediate Design (60% Complete)**  
The Contractor will submit a PDF file showing statement of estimated quantities, tabulations, existing topography and utility plans, roadway plan sheets, alignments and profiles, construction details, drainage plans with cross sections, typical sections, pavement marking, signing, cross sections and any preliminary utility relocations. Typical sections should be final at the 60% plan.

- Prior to submittal of the 60% plan, the Contractor will perform enhanced internal quality control review process (QA/QC review) of design components, including a Discipline Coordination Review meeting. Scan and electronically file documentation of quality control checks and resolutions including 60% Review Checklist and FGR/ITR/ICR Review Forms.

- The State’s District staff will complete review and comment on this submittal 20 working days after the submittal date. The State will provide a single set of consolidated comments in a PDF format. Resolved comments will be incorporated into the 90% plan submittal.

- Contractor will meet with State Project Manager and staff in the St. Cloud office to review the 60% comments. No more than 2 Contractor staff will attend the meeting. The Contractor will send back a PDF with responses to the State’s comments.
d) **Final Design (90% Complete)**

The Contractor will submit a PDF of the proposed Final Design Plans for State’s review and comment. The 90% submittal by the Contractor is what the Contractor would consider final biddable plans. Selected sheets may be sent to Central Office for preparation of any necessary Agreements.

- Prior to submittal of the 90% plan, the Contractor will perform enhanced internal quality control review process (QA/QC review) of design components, including a Discipline Coordination Review meeting. Scan and electronically file documentation of quality control checks and resolutions including 90% Review Checklist and FGR/ITR/ICR Review Forms.

- The State’s District staff will complete review and comment on this submittal 20 working days after the submittal date. The State will provide a single set of consolidated comments in a PDF format. Resolved comments will be incorporated into the 95% plan submittal.

- Contractor will meet with State Project Manager and staff in the St. Cloud office to review the 90% comments. No more than 2 Contractor staff will attend the meeting. The Contractor will send back a PDF with responses to the State’s comments.

e) **Final Design (95% Complete)**

Upon making the revisions from the 90% District Three submittal, the Contractor will submit 2 copies of the signed vellum title sheet.

The original signed and certified prints will be submitted to the State’s Central Office Design Liaison Unit by the State’s District Office for review and approval.

- Prior to submittal of the 95% plan, the Contractor will perform enhanced internal quality control review process (QA/QC review) of design components, including a Discipline Coordination Review meeting. Scan and electronically file documentation of quality control checks and resolutions.

- The State’s District staff will complete review and comment on this submittal within 10 working days of the submittal date. The State will provide a single set of consolidated comments in a PDF format.

- Resolved comments will be incorporated into the 100% plan submittal. The MnDOT Central Office Liaison Unit will make a final review and comment on the certified Construction Plan. The Contractor will resubmit the plans. Contractor should assume one meeting with State staff in St. Paul to review comments.

f) **Final Design (100% Complete)**

Upon making the revisions requested by Central Office Design Liaison Unit, the Contractor will submit new signed and certified sheets, as necessary. An electronic copy of the project’s Geopak design files (.gpk), Corridor Models, Staking files, Excel files and each sheet in Microstation format will be submitted. One copy of the design computations and quantity calculations will also be submitted.

- Prior to submittal of the 100% plan, the Contractor will perform enhanced internal quality control review process (QA/QC review) of design components, including a Discipline Coordination Review meeting. Scan and electronically file documentation of quality control checks and resolutions.

- An electronic copy of the project’s Geopak design files (.gpk), Corridor Models, Staking files, Excel files and each sheet in Microstation format will be submitted. One copy of the design computations and quantity calculations will also be submitted. A “Read Me” file will be submitted with a description of each design.
g) CMGC Constructability Reviews
At each of the submittals in a-e above, in addition to plan reviews, the CMGC will conduct a constructability review. The constructability reviews will occur concurrently with the District 3 Staff reviews. Contractor will incorporate any constructability changes from these reviews into the plan.

3.4 Deliverables

State’s Deliverables
1. Staff Approved Layouts
2. ADA Recommendations
3. District-modified standard plan sheets
4. Right of Way (ROW) file in Microstation DGN format
5. Example Construction Soils Notes and Standard Plates
6. Single set of consolidated plan comments
7. Meeting attendance

Contractor’s Deliverables:
1. 30% plan and construction limits review
2. 60% plan submittal.
3. 90% plan submittal.
4. 95% plan submittal.
5. 100% plan submittal.
6. Cross Sections at 50’ intervals in reconstruction areas, culverts, and any other special features.
   o Includes existing and proposed utilities including drainage
7. ADA checklist #1 with 60% plan submittal
8. ADA checklist #2 with 90% plan submittal
9. ADA Design Memo.
10. Geopak design files (.GPK)
11. Microstation design files (.DGN)
12. Corridor modelling surfaces for the bottom of subcut, grading grade, and top of proposed surface. Files must be in either .xml, .ttm, or .tin formats
13. For any proposed curb lines provide the flowline alignment and profile.
14. Design computations and quantity computations (including excel files for all quantities and tabulations, design tables, and any detail tables created).
15. QA/QC Documents
16. Meeting Attendance

4.0 TRAFFIC CONTROL AND STAGING, SIGNING & STRIPING, LIGHTING AND ITS PLANS
(see work item for Source Code)

4.1 Traffic Control Plans (Source Code 1254)
Contractor’s Lead Traffic Engineer and Traffic Control Designer will participate in staging meetings with the State and PDT at the St. Cloud Office. Anticipate twenty meetings in St. Cloud of 4 hours each.

Contractor will develop detailed staging and traffic control plans, notes, and tabulations for the location of signs, barriers, and striping necessary to accommodate the construction staging as developed by the PDT. Plans and notes will be consistent with the Minnesota Manual of Uniform Traffic Control Devices (MMUTCD), Manual for Temporary Traffic Control Zone Layouts, and MnDOT District 3 practices.
Contractor will prepare a Basic Transportation Management Plan (TMP) for approval by the State. Any traffic modeling or analysis will be done by others.

4.2 **Striping Plans (1” = 100 ft) (Source Code 1255)**
Contractor will prepare detailed plans, notes, and tabulations for the temporary and permanent pavement markings. The plan will include the applicable MnDOT Pavement Marking Typicals found on the MnDOT Traffic Engineering website and plan sheets showing permanent pavement markings on the roadway alignment. Plans and notes will be consistent with the Minnesota Manual on Uniform Traffic Control Devices, Chapter 7 of the MnDOT Traffic Engineering Manual, and MnDOT District 3 practices. The State will provide the recommendation for the pavement marking materials.

4.3 **Signing Plans (1” = 200 Ft) (Source Code 1255)**
Contractor will prepare signing plans for overhead (OH) and other signs that will require changes/replacement due to the new interchange configuration or other roadway changes. Any signs that do not require changes will not be replaced.

Detailed plans, notes, and tabulations will be prepared showing the location of the inplace signs and the location of the permanent signs upon completion of the project. The plan will include necessary typicals found on the MnDOT Traffic Engineering website to construct the permanent signing as shown on the plan sheets. The plan will also include sign designs for new permanent signing. New signs must be designed according to the MnDOT Sign Design Manual and be completed using SignCAD software. Plans and notes will be consistent with the Minnesota Manual on Uniform Traffic Control Devices, Chapter 6 of the MnDOT Traffic Engineering Manual, the MnDOT Signing Plan Design Manual, and MnDOT District 3 practices.

4.4 **Traffic Lighting Plans (Source Code 1252)**
This task consists of replacing the lighting impacted by the new interchange configurations. Included are both tower lights and interchange lighting. Lighting plans will be in State plan format, coordinate correct, and will contain all necessary design information including (but not limited to) the following: quantity tabulation, signature block, abbreviations, symbols, details (standard & special), intersection layout(s) and wiring diagram(s), scale to be approved by District Three staff, appropriate to each area of interest (e.g. - 50, 100 or 200 scale drawing), and include Salvage and Removal Lighting plans as part of the lighting package.

4.5 **Traffic Signal Plan (Source Code 1251)**
This task is for the design of the traffic control signal systems as detailed in the final geometric layout.

It can be assumed that signal plans will be required at the following locations:
- Left Turn Lanes located on TH 10 both east and west of the TH 169/10/101 Interchange
- SPUI at TH 169 and Main Street
- SPUI at TH 169 and School Street
- SPUI at TH 169 and 193rd Avenue

The signal plan will be in State plan format (40 scale drawing), coordinate correct, and will contain all necessary design information including (but not limited to) the following: quantity tabulation, signature block, abbreviations, symbols, details (standard & special), intersection layout(s) and wiring diagram(s).

4.6 **ITS Plans (Source Code 1256)**
This task will include the design of a new ITS system and infrastructure that will be required at the new interchange ramps and bridges.
4.7 Deliverables

State’s Deliverables
1. In-place signal plans, signing and lighting plans.
2. MnDOT’s Traffic web site (http://www.dot.state.mn.us/trafficeng/) for checklists, sample plans, details, etc.
3. Plan sheet format
4. District-modified standard plan sheets
5. District traffic control practices.
6. Typical Details
7. Plan/special provisions review comments

Contractor’s Deliverables:
1. 30, 60%, 90%, 95% and 100% plan submittals (paper and Microstation)
2. Design quantity computations
3. QA/QC documentation
4. Transportation Management Plan (TMP)
5. QA/QC documentation.

5.0 DRAINAGE, CULVERT, TEMPORARY EROSION/SEDIMENT CONTROL, PERMANENT TURF ESTABLISHMENT PLANS AND SWPPP PLAN SHEET (Source Code 1257)
The Lead Hydraulics Engineer will be required to meet with the PDT in St. Cloud to collaboratively develop the items in this section. Anticipate 20 meetings in St. Cloud of 4 hours each.

5.1 Hydraulic Design
All Preliminary Hydraulics Recommendations will be completed by the State per the MnDOT Drainage Manual found at http://www.dot.state.mn.us/bridge/hydraulics/drainagemanual.html. Field review of all structures will not be required.

5.2 Drainage Chart (Tabulation)
Show the type, size, location, and proposed construction impact of inplace drainage culverts and structures within the project limits. The tabulation will show the removals, salvages, reinstall, linings, extensions, etc. of pipes, culverts, drainage structures. Also included in the tabulation will be new culverts and drainage structure information including type, size, lengths, class of pipe, excavation, and bedding. Contractor will use District 3 example drainage plans. The use of Geopak drainage charts are not acceptable. When multiple trunk highways are involved into a new Plan, begin numbering structures from the lowest TH number (i.e., start numbering from TH 10, then TH 101, then TH 169 etc.) beginning structure numbers from west to east, or south to north - CB 1, CB 2, MH 3, etc.) and carry numbering throughout, then continue numbering on next trunk highway. If during the development of the project it is found that an additional structure is needed, the added structure will contain a suffix “A”, “B” or “C” (i.e., MH 24B).

5.3 Pond Design
Provide detailed layouts for the retaining ponds shown on the staff approved layouts.

5.4 Drainage Plan Sheets (1” = 100 Ft) – to be combined with construction plans.
Show proposed culverts, aprons, other drainage structure, labeling size, material type, and structure number if applicable.
5.5 Proposed Drainage Tabulation
A list of the location, type, size, length, inlet and outlet elevations, grade, class, alternative pipe types, erosion control, excavation, and bedding for each proposed pipe and structure. The tabulations will also include quantities associated with box culvert/bridge construction.

5.6 Temporary Erosion Control
For temporary erosion control items, tabulate the location and type of temporary erosion control devices that will be used to control project runoff and sediment during construction. The Best Management Practices will be consistent with the Environmental Documentation and comply with Minnesota Pollution Control Agency (MPCA), Department of Natural Resources (DNR), Corp of Engineers (COE) and National Pollution Discharge Elimination System (NPDES) permit requirements. Erosion control must be developed in conjunction with the PDT. Provide any calculations required by the NPDES permit.

5.7 Permanent Erosion Control
For permanent erosion control items, tabulate the locations and types of permanent turf establishment in areas of construction disturbance and permanent erosion control devices that comply with MPCA Best Management Practices (BMP’s). Erosion control will be developed in conjunction with District 3 Water Resources personnel.

5.8 SWPPP
NPDES Permit Application and Storm Water Pollution Prevention Plan (SWPPP) sheets containing the SWPPP and NPDES permit application will be developed as part of the overall plan set. A stand-alone SWPPP plan set will not be developed. The NPDES will be submitted by the state.

5.9 Permit Exhibits
Contractor will prepare cross sections and other exhibits for the United States of America Corp of Engineers (USACOE) wetland permit and any exhibits required for the DNR Public Waters Permit. State will submit the permits.

5.10 Environmental Green Sheets
Contractor will track and document environmental commitments through design phase for the project using MnDOT’s “green sheet” process.

5.11 Drainage, Erosion Control and Turf Establishment Plan Sheets
Develop preliminary erosion control details in collaboration with the PDT. Meet with the PDT to coordinate usage of BMPs, and identify pay item breakdowns, and necessary special provisions. Prepare drainage, erosion control and turf establishment plans and SWPPP. The details will include notes, symbols and abbreviations of Best Management Practices being applied to control project runoff during construction. Prepare tabulations that summarize the drainage, erosion control and turf establishment items and their locations.

5.12 Ensure all utility conflicts with storm sewer are resolved and tabulated in the utility relocation tabulations.

5.13 Deliverables
State’s Deliverables:
1. Standard district SWPPP template
2. Hydrinfa listing of drainage structures in the project.
3. Preliminary Hydraulic Recommendations which will include the location and the existing conditions of the inplace culverts and storm sewer within the project limits and a general description of what type of repairs/replacements are anticipated.
5. Set of drainage as-builts from the original grading plan
6. Any available video files of structures and pipes.
7. Wetland delineation.
8. NPDES Permit application

Contractor’s Deliverables:
1. Final Hydraulics recommendations including all drainage calculations.
2. Green sheets for environmental commitments
3. 60%, 90%, 95% and 100% drainage plan submittals.
4. QA/QC documentation
5. SWPPP plan sheets
6. Permit coordination including exhibits needed for permits
7. QA/QC documentation.

6.0 SPECIAL PROVISIONS (Source Code 1297)
The Contractor will be responsible for producing the Special Provisions for unique items (0.600 items) in this project not covered in the MnDOT Standard Specifications for Construction. The Contractor will coordinate with the State to review special provisions for all items. Each provision will contain a description, materials, construction requirements, method of measurement, and basis of payment for each item. An electronic draft copy will be submitted to State for review along with the 60%, 90%, 95% and 100% Final Design plans submittal.

6.1 Deliverables
State’s Deliverables:
1. Example standard format for Special Provisions.

Contractor’s Deliverables:
1. Coordination with State on Special Provisions for 0.600 items.
2. Draft Division ST, SS, SZ & SL at 60% plan submittal in Word format.
3. Draft Division ST, SS, SZ & SL at 90% plan submittal in Word format.
4. Final Division ST, SS, SZ & SL at 95% plan submittal in Word format.

7.0 PERMANENT RETAINING WALL STRUCTURES (Source Code 1250)
This task is to determine the locations and types of retaining walls needed on the Project and provide detailed plan sheets. Wall designer will collaborate with the PDT in St. Cloud on wall types. Lead Structural Engineer will be required to meet with the PDT in St. Cloud to collaboratively develop the items in this section. Anticipate 20 meetings in St. Cloud of 4 hours each.

7.1 Retaining Wall
When proprietary or alternate wall systems other than cast-in-place concrete cantilever or counterfort/buttress walls are used, provide Site-specific information required by the wall provider in the roadway Design Documents.

Do not change or intermix wall types within an uninterrupted wall segment. A bridge abutment wing wall shall be considered part of the wall segment. Wall types can be intermixed if the retaining wall and adjacent wing wall have the same architectural treatment facing.

When steps in the horizontal alignment are used in the wall design, provide steps that face away from the direction of traffic. Points of inflection in the horizontal alignment of retaining walls with the wall face angling toward or away from traffic are acceptable.

Do not use steel sheet pile, timber, or recycled material for permanent retaining walls or retaining wall foundations.
Support cast-in-place concrete retaining walls on spread footings, driven piles, or drilled shafts. Install base leveling pads of concrete, crushed stone, or other manufacturer-recommended material for proprietary or alternate wall systems when required by the manufacturer.


7.2 Wall Design Parameters
For design conditions outside the design parameters in the MnDOT Standard Plans Manual, design cast-in-place concrete retaining walls as either cantilever or counterforted/buttressed retaining walls in accordance with the following:

- Use active earth pressure to design for the geotechnical failure modes (sliding, overturning and bearing) as well as for the structural design of the footing.
- Use at-rest earth pressure for the structural design of the stem.
- If the wall is retaining a sloping backfill (slope is steeper than 1V:6H), calculate the at-rest pressure coefficient with the following equation: \( K_0 = (1 - \sin \varphi) (1 + \sin \beta) \)
  
  Where:
  
  \( \varphi \) = drained internal friction angle
  
  \( \beta \) = back slope angle from horizontal plane

- Analyze the retaining wall for the load combinations defined on MnDOT Standard Plan 5-297.639.
- Provide structural backfill per Standard Specification 3149.2D2 and compact to 100 percent density in accordance with Standard Specification 2105.3F1.

For the design of any tiered wall, follow the guidelines in “Design Guidelines for Multi-Tiered MSE Walls”, FHWA/TX-05/0-4485-2.

Provide drainage for overland flow at the top of retaining wall systems. Also provide drainage within the wall system at the bottom rear of the backfill or reinforced fill zone and at the bottom rear of the wall stem or leveling pad. Do not design walls such that surface drainage is allowed to run over the top and down the face of the wall. Do not use Type I drainage systems for permanent retaining walls.

If the longitudinal slope of the footing becomes steeper than 1:10 (V:H), use stepped footings. Slopes within 10 feet of the front of retaining walls shall be 1:4 (V:H) or flatter.

7.3 Retaining Wall Plans
Contractor will prepare the necessary retaining wall plans (including, location, profile, and cross sections) in accordance with current State standards. Contractor will provide changes in drawings that comply with foundations and/or subgrade corrections recommended by State’s Foundations Unit and State’s District Soils Office reports. Contractor will also provide structural calculations for walls that are not covered by State’s Standard Plans.

Contractor will use the wall type, size, and location information from the Preliminary Plan, plus any additional information provided by State, to design the retaining wall system with consideration of economy, visual quality, and constructability. Walls must be offset a minimum of ten feet from the Right of Way line

Contractor will assign a geotechnical engineer experienced with the applicable wall systems to analyze internal, global, and compound stability of the wall system to ensure long term stability. Contractor will provide a 2-3 page report describing recommendations to improve long term stability.

If Contractor incorporates design elements that preclude other wall types from being constructed, Contractor must provide a detailed explanation of methodology to State.
7.4 Deliverables

State’s Deliverables:
1. Geotechnical information
2. Staff approved layouts
3. Standard plan sheets
4. Review and comment

Contractor’s Deliverables:
1. Wall type determination
2. 30%, 60%, 90%, 95% and 100% plan submittals.
3. Design calculations
4. Geotechnical stability report
5. QA/QC documentation

8.0 SOILS BORINGS AND MATERIALS DESIGN RECOMMENDATIONS
(Source Codes 1180 & 1182)
This work will consist of conducting soils borings as needed for the drainage (including ponds) and reconstruction areas of the project and the Materials Design Recommendation.

Key Reference Information Required
Contractor will have ready access, and detailed knowledge, of the following reference information:
* MnDOT Geotechnical and Pavement Design Manual
  http://www.dot.state.mn.us/materials/pvmtdesign/manual.html
* MnDOT Lab manual
* American Association of State Highway and Transportation Officials (AASHTO) Group Index
* State’s Manual on Uniform Traffic Control Devices
* Triangular Textural Classification Chart from the MnDOT Grading and Base Manual

8.1 Solid Stem Auger Borings
Contractor will clear utilities using the Gopher State One Call System, provide necessary traffic control, produce field logs for each soil boring, perform laboratory tests on selected soil samples and produce final boring logs.

Borings will be made in accordance with the MnDOT “Pavement Manual”. All auger flights will have a minimum diameter of 3 ¾ inches. Depth of all borings is to be measured from the existing ground line at the time the boring is performed. Contractor will extend borings to depths determined necessary for design based on the available topographic information and design grades of the roadways. Holes discovering peat and/or muck must be at least 2 feet into the underlying layer and least one boring should extend 15 feet below the apparent peat/muck bottom to provide adequate evidence against a false bottom. Borings at culvert locations will be extended to 5’ below the culvert invert. Borings will be taken as close to the culvert barrel without contacting the drainage structure. No boring will terminate in unstable materials such as muck or peat. All soils encountered in the project area will be correctly classified. To meet this requirement, Contractor will perform soil classification in one of two methods.

A) In the field at the time of sampling (will require lab testing of selective samples to confirm the field identification); or,
B) In the Contractor’s laboratory.

Soil classification will be performed in accordance with the State’s classification system as described in the MnDOT Geotechnical and Pavement Manual.

The “pulling dead” sample method is the preferred method of sampling, and will be used whenever possible. However, the augured method may be acceptable in some situations. However, no more than 5 feet of material will be brought to the surface at one time. When applicable, ground water level will be
measured and recorded in all borings. Measurements of standing water in the bore hole will be noted on
the field boring log and will include the date, time, depth of hole, depth to water surface, method of
measurement and other pertinent information.

State does not anticipate the need for sealing of soil bore holes on this project. However, if bore hole
sealing is required, it will be done in accordance with the Minnesota Rules, Chapter 4725, Rules Relating
to Wells and Borings, effective May 10, 1993, including the revisions of November 15, 1993 and any
current revisions. Please note that the required owner’s copy of the sealing records should be sent to the
District Materials Engineer at the following address:

Sara Johnson, P.E.
Minnesota Department of Transportation - District 3
7694 Industrial Park Road
Baxter, MN 56425-8096

Bore holes will be backfilled in such a manner as to insure against subsequent settlement of the backfill
resulting in a hole hazardous to persons, animals or equipment. Upon completion of the field investigation
work, all surplus material and debris resulting from work will be removed and the premises left in a neat,
orderly condition. Existing improvements disturbed during boring operations will be fully restored in
kind and character as they were before the work started. Restoration work will be the responsibility of the
Contractor, and must be completed within 2 working days of the work at that location being completed.

8.2 Auger boring site selection and frequency
The borings will be performed at drainage structure locations as indicated on the Drainage Overview Map.
Should any of the borings fall within the limits of a bridge or other type structure, they must be taken as
close to the original location as possible without damaging the structure. If unsuitable materials such as
peat or muck are encountered during the drilling, depth of drilling will be increased to identify the termini
of the unsuitable material. Contractor will be responsible for all measuring and marking needed to locate
boring sites. Drilling site selection will be accurate to approximately 5 feet, or better, horizontally from
the required locations as defined above. Boring locations may be slightly altered based on topography,
utilities and stratigraphy encountered or as directed by State’s Project Manager.

8.3 Auger boring data collection
Boring data will be collected using the State’s “Soils Data Dictionary”, or approved equivalent, in
conjunction with Trimble Global Positioning System (GPS), or approved equivalent. Abbreviations for
soils terms, as defined in the State’s Geotechnical and Pavement Manual, are built into the “Soils Data
Dictionary”.

A timely and uniform flow of information to the State is required for determining acceptance of the
Contractor’s work, and for evaluation of the progress of the contractor’s field data acquisition.

8.4 Auger boring location reporting
The final horizontal locations of all bore holes will be provided to the State in two formats:
A) In the appropriate NAD83 (2011) Sherburne County coordinate in feet; and
B) In reference point & offset format, OR centerline station and offset.

The final coordinate location (x,y) of each bore hole will be at least one foot in accuracy. No vertical
location (elevation) is required for the bore holes.

8.5 Classification of auger soil samples - Field
Every sample taken will be visually inspected, classified and given a description. Soils will be classified
by texture, color, moisture and organic content in accordance with State criteria as outlined in the MnDOT
“Geotechnical and Pavement Design Manual” and the MnDOT Triangular Textural Classification Chart”.
Contractor will perform at least 4 gradations and 4 hydrometer tests on non-granular representative soil samples to serve as verification of Contractor’s field soil classification (these numbers can be altered at the discretion of the State’s Project Manager based on soils encountered).

To insure field classification procedures are adequate early in the project, at least 5 of the gradation and at least 2 of the hydrometer tests will be performed, and results submitted to the State’s Project Manager, before 20% of the total number of borings are completed under the contract.

At least 2 representative samples of each major soil type found during the boring activity will be retained by the Contractor and available for inspection until the project is terminated by the State.

The Contractor will perform a minimum of 10 gradation analyses on granular material (sand and/or gravel base materials) encountered.

The Unified System is not adequate and will not be accepted.

Minimum sample quantities required for disturbed boring tests are listed in the Geotechnical and Pavement Design Manual.

8.6 Classification and testing of auger soil samples - Laboratory

The purpose of soils laboratory classification and testing is to verify field classification and ascertain the engineering properties of soils encountered. The field and laboratory testing is described in the MnDOT Geotechnical and Pavement Design Manual. The laboratory procedures will follow those set forth in the State’s lab manual.

8.7 Materials Design Recommendation

The MDR will include, but not limited to, the following information:
A) Project Data sheet (to be provided by the State’s Project Manager)
B) Project Location
C) Traffic Forecast (to be provided by the State’s Project Manager)
D) Existing Pavement and Base
E) Design R Value Justification for each unique pavement design section
F) Life Cycle Cost Analysis (to be provided by the State’s Project Manager where applicable)
G) Grading recommendations
H) Culvert treatment recommendations
I) Geotextile recommendations
J) Backfill recommendations
K) Pavement design recommendations for new and rehabilitated pavements
L) Drainage recommendations
M) Compaction recommendations

A draft MDR and all pertinent data/information will be delivered to the State’s Project Manager. The State’s Project Manager will review and comment within two weeks of receiving all required information.

8.8 Traffic Control

Traffic control will be required whenever working on the roadway or shoulders or parking on the shoulders. All traffic control will be in accordance with the Minnesota Manual on Uniform Traffic Control Devices including the Field Manual.

All traffic control will be the responsibility of the Contractor. Contractor will provide State’s Project Manager at least 3 working days’ notice of any lane closure. All flaggers used on the project must be certified.
8.9 **Project Deliverables**

State’s Deliverables:
1. Soils Access Database
2. Soils Data Dictionary file in Trimble Data Dictionary (*.ddf) file format
3. Example MDR’s
4. Existing soils borings and cores
5. Review and comment on draft and final MDR

Contractor’s Deliverables:
1. Computer files containing information for the soil borings in Trimble GPS data files (in *.ssf format) containing both bore log information as defined in the State’s “Soils Data Dictionary”, and X and Y coordinates
2. Draft MDR
3. Final MDR
4. QA/QC
5. Traffic control for field work
6. Submit electronic project files on CD at the project completion.

9.0 **BRIDGE PROJECT MANAGEMENT** (Source Type 1010)

9.1 **Bridge Design Administration**
State will provide a Bridge Office Project Manager to help manage bridge design activities. It will be the responsibility of the Bridge Office Project Manager to receive the work produced by Contractor, review the work for compliance with contract requirements, and to recommend payment for such work. Contractor will utilize a ProjectWise directory for file sharing. Project directory standards and file naming standards are available upon request to the Bridge Office Project Manager.

9.2 **Schedule Management**
State anticipates that the CMGC will provide a Critical Path Method (CPM) schedule for the construction of the project. Contractor will coordinate its design schedule with the construction schedule in order to meet proposed project completion date(s). This may include dividing the overall project into separate work packages.

9.3 **Bridge Design Meetings**
Contractor will collaborate with State to schedule progress meetings during the final design phase for the design team, which will be held either via Skype/WebEx or in person at State’s Bridge Office. Contractor’s Design Oversight Manager and Lead Bridge Design Engineer will lead the meetings. Contractor will coordinate meeting attendance and agenda items with other project stakeholders as required.

Immediately following progress meetings, Contractor will meet with the Bridge Office Project Manager and District 3 Project Manager to discuss action items and design specific issues and maintain a comment log and action item list (specific to each bridge) that require resolution, which must be included in meeting minutes. Contractor will record and submit meeting minutes to the Bridge Office Project Manager within 3 business days after each meeting.

9.3.1 **Bridge Design Kick-Off Meeting**
Contractor will schedule and facilitate a design kick-off meeting to establish communication protocol for the design, discuss known project issues, and review the project schedule. Contractor will receive available project information from State, including the most up-to-date preliminary design information.
Note: Contractor must submit its list of meeting attendees to State’s Project Manager five days prior to
the meeting. (Assume a 4 hour duration).

9.3.2 Plan Review Meetings
Following State’s review of each Final Design Submittal, Contractor’s Project Manager and Lead Bridge
Designer will participate in meetings (assumed for resolution of plan comments if necessary). If needed,
Contractor will coordinate meeting agenda items, provide response to plan review redlines and provide
comment logs with comment resolution responses to State’s Project Manager for each submittal.
Contractor will also record and furnish meeting minutes within three business days after each meeting.
Six meetings at one-hour meeting durations

9.4 Contractor’s Key Personnel
Contractor’s key personnel required to work on this contract include:

- Lead Project Manager
- Bridge Design Oversight Manager
- Lead Bridge Design Engineer
  - Final Bridge Design Engineer(s) for both superstructure and substructures
  - Quality Control (QC) Checkers for superstructure and substructures
  - Quality Assurance Manager
- QA Manager

Contractor’s Lead Project Manager will administer and manage delivery of the bridge plans as described in
the staff approved layout. Administration includes communication with State, coordination with the PDT,
invoicing, supplemental agreements, cost and schedule updates, billing preparation, and other non-technical
work.

The Bridge Design Oversight Manager will assist State with oversight, coordination, and integration of
ongoing work described, and will lead coordination of design reviews at various phases of the project (e.g.
preliminary plans, 30%, 60%, 90%, and Issue for Bid (IFB) phases) for plans completed by others. No
oversight of work completed by the CMGC cost estimating process, the ICE, or the EE is included in this
contract.

The Bridge Design Oversight Manager will assist State with integration and delivery of all components of the
project, including but not limited to the following specific tasks:

- Evaluate input received by the CMGC and assist with assessment of staging alternatives.
- Collaborate with PDT for sequencing of bridge and roadway construction.
- If applicable, develop bridge specific staging plans based on project-wide staging plans (in
  collaboration with PDT).
- Assess needs and benefits obtained by using temporary works for maintaining traffic.
- Consider opportunities for accelerated bridge construction.
- Develop the project design schedule for the entire project for delivery of 30%, 60%, 90% and IFB
  plans for use by the CMGC, ICE, and EE to reconcile pricing. Note: State and the CMGC will
  provide input as ongoing work is completed.
- Collaborate with bridge designers about expectation for reviews of grading plan components at the
  30%, 60%, and 90% design phases for reviewing approach panels, retaining wall tie-in points adjacent
to bridges, fencing, lighting, signals, overhead signs, storm water drainage, utilities, and maintenance
of traffic.
• Review bridge plans (provided by others) for footing elevations proposed early on for proper top-of-footing elevations and to identify interference with any utilities.
• Compare all utilities with the MnDOT LRFD Manual Utility Zones for Buried Utilities (refer to Bridge LRFD Manual Section 2.4.1.6.2).
• If applicable, review retaining walls included in the grading plans.
• Assist State at PDT meetings to provide updates to successfully coordinate and integrate development of final bridge plans and final grading plans for the project.
• Maintain an action item log for ongoing coordination during development of bridge plans and grading plans, and communicate action items to the PDT (including work done by others).

The Bridge Design Oversight Manager will also lead discussions with the PDT to ensure that project details are communicated to the team and successfully integrated into the overall project.

The Bridge Design Oversight Manager will NOT provide oversight of cost estimating activities, nor will the Bridge Design Oversight Manager be expected to provide an independent check of the bridge design. The Bridge Design Oversight Manager is intended to ensure quality management for further development of the project including multi-discipline reviews, collaboration, oversight, communication, and leadership of a coordinated effort to deliver plans in accordance with best practices specific to a major corridor project using State’s CMGC delivery method.

Contractor’s Lead Bridge Design Engineer will manage development of final bridge plans based on the staff approved layout.

Contractor’s QA Manager will be responsible for implementation and management of a QMP and QA and QC Procedures. Refer to section 10.0 of this work scope for requirements.

No changes in Contractor’s project management or lead design personnel may be made without prior written consent of the Bridge Office Project Manager. State will notify Contractor immediately if there are changes to State’s project management or lead design personnel.

10.0 Bridge Quality Management Plan and Quality Assurance/Quality Control Procedures (Source Type 1250)
Contractor will develop a QMP that specifies how Contractor will perform QA and QC activities throughout the duration of the project to ensure delivery of a quality product in a timely manner that conforms to established contract requirements. Contractor will prepare the QMP and distribute it to all project team members, including subcontractors. Components of the QMP must include the following:
• A List of Requirements
• Checking Procedures for calculations
• Checking Procedures for 3D Model
• Checking Procedures for plan development
• Quality Control Verification
• Definitions
• Project Design Oversight Review (of all components of the 169 Redefine Project)
• A process for management of tasks particular to successful delivery of the 169 Redefine Project through the preliminary and final design phases, showing how the 169 Redefine Bridge Design Oversight Manager and design team are integrated with the PDT.
Independent peer review contracts are not anticipated to be required for this project, but will be assessed by State upon further development of preliminary bridge plans.

Contractor must ensure that, at a minimum, the following QC procedures are performed and included in the draft Project Design Schedule for delivery of preliminary and final plans:

- **Design, 3D Model and Plan Sheet Check**
  Contractor is responsible for the completeness and accuracy of its work. Calculations, 3D Model and plan sheets must be independently checked and reconciled prior to submittal. Review comments from State on Contractor’s various plan review submittals does not relieve Contractor of liability for an inaccurate or incomplete bridge plan.

- **Software**
  All computer programs and/or spreadsheets utilized by Contractor must be verified by Contractor’s in-house QA Program and conform to all requirements of MnDOT Load and Resistance Factor Design (LRFD) Bridge Design Manual Section 4.1.

- **Quality Assurance**
  Contractor’s QA Manager will review the entire plan design and production process to ensure the completeness and adequacy of their work and conformance with Contractor’s QA procedures.

**11.0 FINAL BRIDGE DESIGN** (Source Types: ABUT, DECK, GEOM, PIER)
Contractor will conduct detailed bridge design, develop 3D models and prepare Final Certified Bridge Plans in accordance with the provisions detailed below. If State determines at any time during design that major plan revisions are necessary due to Contractor plan errors, Contractor will furnish revised plan sheets at no cost to State.

Contractor will perform all required engineering to determine the geometric, material, and procedural requirements for the construction of the bridges.

**11.1 Design Standards and Plan Preparation**
Final Certified Bridge Plan sheets will be prepared in accordance with the following manuals, standards and documents:

- a) MnDOT Load and Resistance Factor Design (LRFD) Bridge Design Manual
- b) American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications
- c) MnDOT Bridge Details Manual (Parts I and II)
- d) MnDOT Standard Specifications for Highway Construction
- e) MnDOT Computer Assisted Design & Drafting (CADD) Standards
- f) MnDOT Summary of Recommended Drafting Standards
- g) AASHTO Manual for Bridge Evaluation, current edition
- h) MnDOT Staff Approved Layout
- i) MnDOT Checking List for Final Plans
- j) MnDOT Preliminary Bridge Plans
- k) Project Visual Quality Manual (VQM)
- l) MnDOT Roadway Design Plan

All plan submittals will be on 11x17 paper, 20 lb. white bond or approved equivalent. Plan sheets will be produced using the current version of MicroStation. **All 3D model submittals will be on a flash**
drive or approved file transfer system and must be the current version of Microstation and in a format that can be reviewed by the State.

11.2 Bridge Surveys
State will provide survey sheets. Contractor must review the survey sheets and report any additional survey needs to State’s Project Manager as soon as possible. If needed, additional survey work will be added to this contract by amendment.

11.3 Foundations
The Foundation Analysis and Design Recommendations (FADR) will be provided by State’s Foundations Unit.

11.4 Deck Drainage System
If the Preliminary Plan indicates the need for deck drainage, then Contractor will design a deck drainage system(s) on the bridges based on the allowable spread criteria for the given roadway geometrics based on MnDOT Technical Memorandum No. 11-14-B-05. Use design frequency storm data from the Atlas 14 Regionalization Intensity-Duration-Frequency for the region in which the bridge is located. Contractor must coordinate the drainage system design with the roadway and grading design consultant.

11.5 Aesthetics
Contractor will incorporate aesthetic details consistent with the Preliminary Bridge Plans and VQM developed for the project. State anticipates having the VQM available at the kick-off meeting, with aesthetics finalized in the signed preliminary plans.

11.6 Cost Estimating
Contractor will provide estimated item quantities and pay item lists with all plan submittals. Contractor will consult with State to obtain Pay Items for inclusion with 30% Plans, and will update estimated quantities with each submittal for use by CMGC and estimating teams.

11.7 3D Bridge Models
Overview
In support of the Department’s goal to utilize 3D design tools in preconstruction, the Contractor will develop a BrIM model including all pertinent bridge elements in order to develop construction plans. The level of development (LOD) can vary on each model depending on the intended use.

LOD Levels
LOD 100 – The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element can be derived from other Model Elements.

LOD 200 – The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

LOD 300 – The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

LOD 350 – The Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of quantity, size, shape, location, orientation, and interfaces with other structural systems. Non-graphic information may also be attached to the Model.
LOD 400 – The Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the Model Element.

Geometry-Only 3D BrIM Model
The bridges will have the geometry modeled in 3D in order to assist the roadway design coordination. Plans may be developed in a conventional 2D method. The required level of development for each bridge element (if applicable) is as shown below in Table 1.

Table 1: Level of Development for Geometry-Only 3D BrIM Model

<table>
<thead>
<tr>
<th>Component</th>
<th>LOD 100</th>
<th>LOD 200</th>
<th>LOD 300</th>
<th>LOD 350</th>
<th>LOD 400</th>
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<td>X</td>
<td></td>
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<tr>
<td>Bridge deck rebar</td>
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<tr>
<td>Bridge barrier concrete</td>
<td>X</td>
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<td>Barrier rebar</td>
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<tr>
<td>Barrier conduit</td>
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<td></td>
<td>X</td>
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<td>Pier concrete</td>
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<td>Pier rebar</td>
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<td>Pier piles</td>
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<td>X</td>
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<td>Pier aesthetic treatments</td>
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<td>X</td>
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<tr>
<td>Girders</td>
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<td>X</td>
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<tr>
<td>Crossframes/diaphragms and stiffeners</td>
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<td>X</td>
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<tr>
<td>Girder shear connectors</td>
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<tr>
<td>Deck drains and drainage system</td>
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</table>

11.7 Final Design Submittals
Contractor will coordinate plan reviews with an assigned Final Bridge Design Unit of State’s Bridge Office. The District 3 Project Manager and DOM will be copied on all significant correspondence. For each submittal, Contractor must submit a flash drive containing all electronic files and documents required in the subarticles herein.

11.7.1 30% Plan Review
The 30% Plan provides State an early review of the final plan preparation for conformance with the approved Preliminary Plan, aesthetic guidelines, and key design specifications. The intent of
this review is to identify design discrepancies at an early stage and avoid major plan modifications resulting from future reviews. At a minimum, the 30% Plan will include:

a) **General Plan and Elevation Sheet(s)**
   For this submittal, the General Plan and Elevation sheet(s) need to be completed only to the extent necessary to show general dimensions, elevations, cross section with proposed bridge type, architectural features, stage construction information, and basic design data. The sheet(s) will be based on the approved Preliminary Plan.

b) **Pay Items and estimated quantities**
   In addition to the pay item sheet, Contractor will provide a Microsoft Excel spreadsheet that includes all pay items and estimated quantities for use the estimating teams. It is understood that estimated quantities will be subject to change with each submittal, but additional effort will be required to provide accurate estimated quantities for all pay items with each submittal, including the initial 30% Plan stage.

c) **Framing Plan**
   Include a preliminary beam run with computations.

d) **Bridge Layout Sheet(s)**
   For this submittal, the Bridge Layout Sheet(s) must show a line diagram that indicates the control point, work line, reference lines, and proposed working point locations. The tabulations required do not need to be completely filled in; however, the sheet(s) will indicate the diagonal and other dimensions that will be included in the Final Plan. It will also contain any corner views sections, and notations (i.e. expansion joint details at gutters, sidewalks, barriers, etc.) needed to clarify the working point locations. Corner details may be detailed on a separate sheet for clarity.

e) **Abutment Layout Sheet(s)**
   For this submittal, the abutment layout sheet(s) need to be completed only to the extent necessary to show footing size and the top/bottom elevations for coordination with Final Road Design. It will also contain any tie-in points to adjacent bridges, retaining walls, or both. Contractor will promptly coordinate any changes in footing size, elevation, or both that occur between the 30% Plan and the 60% Plan that would impact the grading plans. Design input assumptions by the contractor may include controlling parameters that reduce the number of individual abutment or wing designs.

f) **Architectural or Special Detail Sheet(s)**
   Architectural or special detail sheet(s) showing any standardized shapes proposed to maximize repeatability of pier forms and other special details that require early coordination between Contractor and State prior to Final Plan preparation.

g) **Bridge Survey Sheet(s)**
   Survey sheets from the approved Preliminary Plan are to be included in this submittal; however, they are not required to be completed.

h) **Stage Construction Detail Sheet(s)**
   Stage construction and deconstruction of the project is under development by others. Preliminary Plans will indicate general staging schemes and note(s) for any specific bridges requiring refined stage construction details that will be required for inclusion in Final Bridge Plans.

i) **Bridge Mounted Overhead Sign Structures**
   Design and plans for overhead sign structures is assumed to be provided by others and included in the project roadway plans. If applicable, assumed work for bridge mounted overhead sign structures is limited to identification of the structure on the General Plan and Elevation sheets with reference to see the roadway plans. Loads from sign structures will be provided by State to be incorporated into the structural design by Contractor.

j) **3D Models**
   For this submittal, the 3D models will include the location and approximate size of the abutment and pier footings, the bridge deck modeled to the level required to accurately show begin and end of bridge locations, and any other bridge elements that are
anticipated to be in conflict or nearly in conflict with utilities. It will also contain any tie-in points to adjacent bridges, retaining walls, or both. Contractor will promptly coordinate any changes in footing size, elevation, or both that occur between the 30% Plan and the 60% Plan that would impact the grading plans.

k) Any supporting design computations used to develop the aforementioned items.

Contractor will submit 2 sets of the 30% Plans to State for review, along with plan and calculation check prints, 3D models and electronic Microsoft Excel format pay items and estimated quantities. State will return 30% Plan comments to Contractor within 20 working days. Contractor may proceed with further design during this review period.

11.7.2 60% Plan Review
The intent of the 60% Plan Review is to verify Contractor’s progress toward plan completion and evaluate against project and contract timelines. The 60% Plans must include 2 full sets of in-progress plan sheets, 3D models, working copies of electronic design files (MicroStation, Geopak), Draft Unique Special Provisions, and updated pay items and estimated quantities (including updated Microsoft Excel format pay items and estimated quantities) for use by CMGC and estimating teams. Include PC beam design, abutment details, and pier design and details. The 3D models must be complete to the Level of Development as shown in Table 1. State’s Bridge Office will return 60% Plan review comments within 20 working days. Include plan and calculation check prints, along with the comment log or other process documenting resolution of all State plan review comments from the 30% review. Contractor will be allowed to continue with design during this submittal.

11.7.3 90% Plan Review
The intent of the 90% Plan Review is for State to verify that the plan is acceptable for the State Bridge Engineer’s signature. The 90% Plans should be complete in all areas to the extent that it can be certified by Contractor, although a certification signature is not required until after this review has been completed. Contractor will submit the 90% Plan and 3D models to State with updated pay items and estimated quantities (including updated Microsoft Excel format pay items and estimated quantities) for use by CMGC and estimating teams, together with the plan and calculation check prints and comment log or other process documenting resolution of all State plan review comments from the 60% review. State’s Bridge Office will return 90% Plan review comments within 20 working days. Contractor will also submit an electronic copy of finalized Unique Special Provisions with the 90% Plan submittal.

11.7.4 Construction Elevations
Upon reconciliation of State’s 90% Plans comments, Contractor will produce construction elevations for the bridge(s). Regardless of the software used, the output format for construction elevations must be consistent with State’s construction elevation program. State will provide instructions and an example of construction elevations output upon request. The construction elevations output must be submitted to State with the Final Certified Bridge Plans.

11.7.5 Final Certified Bridge Plans
Upon incorporation of State’s 90% Plan comments, Contractor will submit the Certified Final Bridge Plan and final 3D models to State.

12.0 BRIDGE DESIGN DELIVERABLES
Contractor will submit all bridge design deliverables directly to State’s Bridge Office Project Manager.

12.1 Contractor Deliverables
a) QMP
b) 30% Plan (2 sets, 11” x 17” paper) – Anticipated due date: September, 2020
   1) .pdf file of in-progress 30% Plan
   2) Copy of in-progress 3D models
3) Plan and calculation check prints and comment log (electronic copy)
4) Estimated item quantities and pay item lists, including updated Microsoft Excel format
5) Draft construction elevations output (to verify formatting)

c) 60% Plan (2 sets, 11” x 17” paper) – **Anticipated due date: January, 2021**
1) Working copies of electronic design files (MicroStation)
2) .pdf file of in-progress of 60% Plan
3) **Copy of in-progress 3D models**
4) Plan and calculation check prints and comment log (electronic copy)
5) Estimated item quantities and pay item lists including updated Microsoft Excel format
6) Draft Unique Special Provisions (electronic copy)

d) 90% Plan (2 sets, 11” x 17” paper) – **Anticipated due date: May, 2021**
1) Working copies of electronic design files (MicroStation)
2) .pdf file of in-progress 90% Plan
3) **Copy of in-progress 3D models**
4) Plan and calculation check prints and comment log (electronic copy)
5) Estimated item quantities and pay item lists including updated Microsoft Excel format
6) Unique Special Provisions (electronic copy)

e) Final Certified Bridge Plans (2 sets, 11” x 17” paper) – **Anticipated due date: October, 2021**
1) Final Design Calculations (electronic copy)
2) Final Quantity Calculations and Pay Items (electronic copy) in Microsoft Excel format
3) Plan and calculation check prints and comment log (electronic copy)
4) MicroStation files of Final Bridge Plans. MicroStation files will allow direct reproduction of all plan sheets with reference files detached.
5) **Final 3D models**
6) Construction elevation output
7) Flash drive with electronic copies of all final deliverables

12.2 State Deliverables
a) Signed Preliminary Bridge Plan
b) Checking List for Final Plans
c) Soil borings analysis
d) Foundations recommendations
e) Geopak (.gpk) files
f) Project VQM
g) Plan review comments
h) Signature and distribution of the Final Bridge Plan
i) Bridge Special Provisions (covering common items)
j) FADR
k) Roadway lighting plans
l) Ornamental rail details

13.0 LOAD RATING ANALYSIS (Source Type: 2850)
Contractor will provide a load rating analysis for its assigned bridge(s) and provide a Bridge Rating and Load Posting report. All load rating work will be done in accordance with the AASHTO Manual for Bridge Evaluation, current edition with interims.

Contractor will provide the load rating using AASHTOWare BrR software. Guidelines for AASHTOWare BrR input requirements will be provided by State upon request. If the bridge cannot be rated with AASHTOWare BrR, Contractor must use another commercially available structural analysis software with the approval of State. The software must be capable of running overweight vehicles as described below.

Contractor will load rate the bridge carrying vehicular traffic for Load and Resistance Factor Rating (LRFR) using the following:
a) HL-93 loading
b) Minnesota Standard Permit Trucks G-80

c) Minnesota Standard Permit Trucks G-07, when a non-BrR software is used

The LRFR rating factor for new bridges must be a minimum of 1.0 at the Inventory level for HL-93 loading and 1.15 at the Operating level for permit loading. Contractor must demonstrate that the minimum rating factors are being provided during the design of the bridge. For bridges with a minimum of one span over 200 feet long, the permit vehicle loading must consist of a combination of the permit vehicle and lane load. The lane load must be in accordance with Article 3.6.1.2.4 of the AASHTO LRFD Bridge Design Specifications, except that the load will be 0.20 klf.

Contractor will rate the deck for any design that deviates from MnDOT standard design tables. Rate and report each separate superstructure component, segment, or type within the overall bridge; at a minimum, rate for moment and shear at the tenth points of each span. The overall rating must be the lowest rating of any individual component, segment, or type. The final rating and each component rating must be accompanied by the location of the rating, the limit state, and the impact factor. Where ramps extend onto a bridge, rate the ramp as a separate member. For culverts, complete MnDOT Form 90.

13.1 Contractor Deliverables

a) At the 60% Plan Submittal, Contractor will submit the following:

1) AASHTOWare BrR software file or the file from another commercially available software.

2) Any supplemental documentation in memo format that cannot be found in the plan sheets provided with the 60% Plan.

b) Contractor must investigate the applicability of AASHTOWare BrR. If this software will not work for the bridge, then Contractor must submit a brief memo documenting the investigation and findings.

c) At the Final Certified Plan Submittal, Contractor will submit the following:

1) Bridge Rating and Load Posting Report. The AASHTOWare BrR software file or the file from another commercially available software must be submitted with the Bridge Rating and Load Posting Report. The ratings must be based on the final configuration of the bridge.

14.0 APPROACH PANEL DESIGN & DETAILING (Source Type: 1250)

For bridge approach panels, Contractor will:

a) Choose and modify the appropriate standard plan sheets necessary for the bridge approach panels ([http://standardplans.dot.state.mn.us/StdPlan.aspx](http://standardplans.dot.state.mn.us/StdPlan.aspx)). It has been assumed that modifications are geometry and joint location related and do not include additional structural calculations including barriers or moment slab design/detailing.

b) Prepare any other necessary details needed for the construction of the bridge approach panels

c) Coordinate the approach panel design with the roadway and grading design consultant

d) Submit final plan sheets to State for bridge approach panels

e) Submit any necessary special provisions for the bridge approach panels (for any construction requirements in addition to the State’s current standard provisions)

f) Submit Microstation files to State for bridge approach panels designed

Contractor will provide plans signed by a professional engineer registered in the State of Minnesota and any special provisions needed for the approach panels. The approach panel plan sheets will be included in the grading plans being prepared by State. Contractor will provide a list of approach panel sheets expected for detailing at the same time as the 30% bridge plans. The approach panel sheets are not expected to be complete with the 30% submittal. Contractor must provide finalized approach panel plans sheets at the same time as the 60% bridge plans.

14.1 Contractor Deliverables

a) At the 30% Plan Submittal, Contractor will submit the following:
1) Standard approach panel sheets with no modifications done, but a list of proposed sheets and the indication whether or not those sheets will be modified. The primary purpose is to identify an approximate sheet count for the grading plans.

b) At the 60% Plan Submittal, Contractor will submit the following:
  1) Certified approach panel sheets and any special provisions needed for approach panels.

15.0 CONSTRUCTION SUPPORT (Source Type 1800)
During the construction phase of the project, Contractor will respond to Requests for Information (RFIs) and provide supporting design analysis as needed. If these services are needed, State’s Project Manager will send the RFIs to Contractor, and Contractor will direct its responses back to State’s Project Manager. Anticipate 120 hours for construction support.

16.0 CONSTRUCTION DESIGN SUPPORT (Source Code 1250)
Contractor will provide 500 hours of Post-letting Construction support and be available to respond to questions or design related issues that arise during the construction phase. Contractor will attend Pre-construction meetings as requested by the State.

17.0 PROJECT SCHEDULE

<table>
<thead>
<tr>
<th>Construction Limits</th>
<th>May, 2020</th>
<th>Verify Construction Limits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>30% Plan</td>
<td>September, 2020</td>
<td>Plans completed plan for MnDOT review and CMGC constructability review.</td>
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<tr>
<td></td>
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<td>Geotechnical reports</td>
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<td>60% Plan</td>
<td>January, 2021</td>
<td>Plans completed plan for MnDOT review and CMGC constructability review.</td>
</tr>
<tr>
<td>90% Plan</td>
<td>May, 2021</td>
<td>Plans completed plan for MnDOT and CMGC constructability review.</td>
</tr>
<tr>
<td>95% Plan</td>
<td>August, 2021</td>
<td>Plans for MnDOT Central Office review.</td>
</tr>
<tr>
<td>100% Plan</td>
<td>October, 2021</td>
<td>Signed plan complete and ready to be submitted to Central Office.</td>
</tr>
<tr>
<td>Assumed letting</td>
<td>March, 2022</td>
<td></td>
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<tr>
<td>Construction Design Support</td>
<td>July, 2022 thru November 2024</td>
<td>As needed</td>
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