Request for Proposal
Engineering Consulting Services for
PTH 100 Reconstruction Functional / Preliminary Design Study
and
the Proposed St. Norbert Bypass Functional Design Study

APPENDIX C

Terms of Reference
1) **Background**

**PTH 100**

Conceived in the 1950s as a ring road around Winnipeg and its adjoining cities, the original purpose of the Perimeter Highway was to serve as a bypass for highway traffic due to difficulties that highway traffic faced in travelling through Winnipeg’s urban centre.

Provincial Trunk Highway (PTH) 100 (the South Perimeter Highway) was constructed in the 1950s and 1960s to a parkway standard, with a narrow raised median, and a combination of stop-controlled at-grade intersections and interchanges. With the exception of several of the major intersections being signalized for safety and capacity reasons, PTH 100 has remained largely unchanged since then.

In 1988, the *South Perimeter Highway Preliminary Design Study* was completed from PTH 3 to PTH 59. That study identified the requirements for upgrading PTH 100 to a fully access-controlled facility, and has served as a basis for making decisions regarding protection of right-of-way and the implementation of improvements.

Since the 1988 study was published, urban residential land development has reached PTH 100 in some areas (such as River Park South and Waverly West) and, with that, the function of PTH 100 has evolved. Although the bypass function remains very important, the percentage of traffic it represents has declined due to the growth of inter-urban and intra-urban traffic on PTH 100. Traffic volumes on PTH 100 have doubled since 1988 and, as a result, the safety, operational, and capacity deficiencies have evolved and grown since that time.

Given the deteriorating physical condition and technical operations of the South Perimeter Highway and the time elapsed since the previous guiding document some three decades ago, the Department has decided it needs to be revisited before it commits to developing a reconstruction plan for PTH 100.

**St. Norbert Bypass**

The St. Norbert Bypass is a proposed high speed multi-lane expressway from PTH 75 to PTH 100 located on the west side of St. Norbert. The proposed Bypass would allow heavy truck and other traffic an alternative route to access PTH 100 rather than passing through the community of St. Norbert on PTH 75.

2) **Overall Project Goal**

The goal of this project is to develop a preferred functional design (FD) for reconstructing PTH 100 to a freeway standard, and conceptual and preliminary designs (PD) of the associated structures. The goal also includes the development of a preferred FD for a proposed bypass of St. Norbert to expressway standards and conceptual designs of the associated structures.
The functional and preliminary designs will be used as the basis for Department decisions such as:

- Protecting and acquiring land that will be needed for right-of-way purposes
- Identify and protect for required local internal roads and service roads to provide adjacent land access locations and guide adjacent development
- Construction planning, prioritization, and budgeting
- Environmental approvals and licensing
- Interactions with railway crossings and active transportation facilities
- Utility placement and relocation
- Detailed design of the highway, interchanges, and structures
- Discussions with land owners, stakeholders, and the public

3) **Overall Project Limits**

The PTH 100 Reconstruction Functional / Preliminary Design Study (F/PDS) extends from the north functional limit of the PTH 1W (Portage Avenue) / PTH 100 interchange to the north functional limit of the PTH 1E (Fermor Avenue) / PTH 100 interchange. The Department defines an interchange’s functional limit as the location where the approach / departure roadways return to typical cross-section and traffic flow characteristics are no longer under the influence of interchange entrances, exits, and weave sections.

The proposed St. Norbert Bypass Functional Design Study (FDS) extends from PTH 100 (near Kenaston Boulevard) to PTH 75 (south of PR 247).

Refer to **Figure 1 – Study Areas** for a graphical representation.
4) **Study Scope**

The scope of this study focuses on two highway corridors which have a common connection at PTH 100 / Kenaston Boulevard where the proposed St. Norbert Bypass would tie into the South Perimeter Highway. While the PTH 100 Reconstruction F/PDS will be used as a guiding document for the upcoming reconstruction of PTH 100 and associated access improvements, the proposed St. Norbert Bypass FDS will be used for right-of-way preservation and as a long-term transportation and land use planning tool.

**PTH 100**

**Overview**

The PTH 100 Reconstruction F/PDS will result in a functional design for PTH 100 that includes a four-lane divided highway with a depressed rural median that accommodates potential expansion to six-lanes in the future. While the overall intent is for the South...
Perimeter Highway to function as a fully-access controlled freeway, MI will place a strong emphasis on infrastructure that is both technically sound / standards-based and economically viable. To be clear, MI is looking for improvements that are both safe and affordable.

The Department does not envision implementing all of the recommended improvements from this F/PDS at once, including PTH 100 becoming a fully-access controlled facility. Rather, the F/PDS will contain a construction plan that establishes a staged approach to implementing the mainline reconstruction, intersection / interchange improvements, access management revisions, and required structural improvements. If possible, and where it makes sense to do so, the Department would like to begin reconstruction of the South Perimeter Highway as soon as possible, even in advance of the conclusion of this study in areas where it makes sense to do so.

Cross-Sections

Ideally, the PTH 100 cross-section would remain consistent throughout the entire length of the South Perimeter Highway. However, at certain locations, a consistent cross-section may not be feasible. While some work has already been undertaken by the Department to determine the viability of certain cross-section configurations, additional work remains to be done by the successful Proponent.

Access Management

A key component of the PTH 100 Reconstruction F/PDS is the identification of which existing roadway connections and median openings are to be permanently closed. Stakeholder consultations are anticipated to be extensive, including work with local governments in pursuit of Council resolutions in support of the proposed access management plan.

A connecting roadway network within the entire Study Area will need to be developed that directs all local road and service road traffic to the proposed interchanges on PTH 100 when all existing local road intersections, median opening, and access are closed. At this point in time the Department is assuming all connections / crossings not listed in the subsection below will be closed as reconstruction of PTH 100 occurs. The successful Proponent will be required to analyze this assumption and provide their own recommendations.

Intersections / Interchanges and Other Accesses

As part of the reconstruction of PTH 100 and the upgrading of this facility to a freeway standard, all connections to and crossings of the South Perimeter Highway (other than those permanently closed as identified under “Access Management”) will be considered under this F/PDS. This includes all roadway, railway, active transportations (AT), and water course crossings and connections. While some considerations will be conceptual in nature, others will require extensive analysis and design efforts. Table 1 below provides an overview of the anticipated level of effort required at each of the 22 connections /
crossings MI knows require analysis. A description of each follows. Other connections/crossings within the PTH 100 Study Area may require analysis in order for the F/PDS to be considered complete, including AT facilities such as the Harte Trail and connections to Waverley West. It is the Proponent’s responsibility to determine if additional locations require analysis. To be clear, Table 1 and the subsequent descriptions are intended to aid the Proponents in better understanding the Department’s goal for this study. It is not intended to be an exhaustive dialogue on all work items required at each of the 22 listed locations, nor is it intended to be an exhaustive listing of all locations requiring analysis and design. The 22 connections are referenced graphically on Figure 2 - PTH 100 Connection / Crossing Locations.

<table>
<thead>
<tr>
<th>#</th>
<th>Connection / Crossing</th>
<th>Roadway Design Level¹</th>
<th>Structure Design Level²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PTH 1 W (Portage Avenue)</td>
<td>●</td>
<td>Modify Existing</td>
</tr>
<tr>
<td>2</td>
<td>Assiniboine River Crossing</td>
<td>●</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>PR 241 (Roblin Boulevard)</td>
<td>●</td>
<td>None</td>
</tr>
<tr>
<td>4</td>
<td>PR 427 (Wilkes Avenue) / CN Rivers Subdivision</td>
<td>●</td>
<td>Modify Existing</td>
</tr>
<tr>
<td>5</td>
<td>Four Mile Road / Wyper Road</td>
<td>●</td>
<td>Modify Existing</td>
</tr>
<tr>
<td>6</td>
<td>CEMR Carman Subdivision</td>
<td>●</td>
<td>Modify Existing</td>
</tr>
<tr>
<td>7</td>
<td>PTH 3 (McGillivray Boulevard)</td>
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</tr>
<tr>
<td>8</td>
<td>Road 8E</td>
<td>●</td>
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<tr>
<td>9</td>
<td>CPR La Riviere Subdivision</td>
<td>●</td>
<td>Modify Existing</td>
</tr>
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<td>10</td>
<td>PR 330</td>
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<td>Modify Existing</td>
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<tr>
<td>11</td>
<td>Kenaston Boulevard</td>
<td>●</td>
<td>Modify Existing</td>
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<tr>
<td>12</td>
<td>CN Letellier Subdivision</td>
<td>●</td>
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<td>13</td>
<td>PTH 75 (Pembina Highway)</td>
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<td>Red River Crossing</td>
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<td>15</td>
<td>PR 200 (St. Mary’s Road)</td>
<td>●</td>
<td>Modify Existing</td>
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<tr>
<td>16</td>
<td>St. Anne’s Road</td>
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<tr>
<td>17</td>
<td>Seine River Crossing</td>
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<td>CPR Emerson Subdivision</td>
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<td>19</td>
<td>PTH 59S (Lagimodiere Boulevard)</td>
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<td>22</td>
<td>PTH 1E (Fermor Avenue)</td>
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<td>Modify Existing</td>
</tr>
</tbody>
</table>

NOT FOR BIDDING PURPOSES
2. Roadway Design Level – the suggestion to ‘Modify Existing’ or ‘New Design’ is based on the information MI has and the assumptions MI has made to date. Through data collection, analysis, and alternatives development the Proponent will need to determine the most cost-effective solutions that also account for the safety of the traveling public.

2. Structure Design Level – the suggestion to ‘Modify Existing’ or ‘New Design’ is based on the information MI has to date. The Proponent will need to determine the most appropriate management plan during the course of this assignment. The direction to provide a Conceptual or Preliminary structure design shall be considered the required deliverable.

3. Denotes a full bridge Preliminary Design is required. All others Conceptual Designs. No structures design is required where ‘None’ is indicated.

1. PTH 1W Interchange (Portage Avenue, Bridge Site No.: 470-10)
   - A roadway functional design for modifying the PTH 1W / PTH 100 interchange that would eliminate the growing traffic operational issues related to the short weaving distances associated with the current cloverleaf interchange. This design shall incorporate a 6.1m raised median on PTH 100 / 101 as shown on Dillon’s 1993 General Arrangement drawing (Sheet 5, Site No. 470-10), which will be provided to the successful Proponent. A conceptual structures design will be required for modifications to the existing structure.
   - A structures conceptual design for the future six-laning of PTH 100 is required. The conceptual design may propose all new structures or incorporate the existing structure if feasible and there is sufficient service life left in the structure to be economically viable.

2. Assiniboine River Bridge (Bridge Site No.: 2924-00)
   - A conceptual alignment of PTH 100 as a four-lane divided highway with a depressed rural median, including provisions for its future six-laning between PTH 1W and PR 427 (Wilkes Avenue), was developed in a recent study (which will be provided to the successful Proponent) and is to be incorporated into this study for reference purposes.
   - An AT functional design is required to connect the bridge sidewalk to population centres or other AT facilities north and south of the river.

3. PR 241 Interchange (Roblin Boulevard, Bridge Site Nos.: 2051-01 and 2051-02)
   - The PTH 100 / PR 241 (Roblin Boulevard) interchange is currently being reconstructed (structure and ramp modifications), and the previously-developed layout (which will be provided to the successful Proponent) is to be incorporated into this study for reference purposes.
   - Provisions have been made as part of that study to accommodate cyclist / pedestrian requirements on the new structure.
Figure 2 - PTH 100 Connection / Crossing Locations
4. PR 427 / CN Rivers Subdivision Interchange (Wilkes Avenue, Bridge Site No.: 2959-00)
   - A roadway functional design for modifying the PTH 100 / PR 427 interchange ramps to bring them to current Department standards for the existing narrow median highway, while allowing for the ramps to be integrated into the future depressed rural median four-/six-lane stages of PTH 100.
   - A structures conceptual design for any short-term modifications proposed to the existing PTH 100 / PR 427 interchange / CN Rivers Subdivision grade separation structure.
   - A structures conceptual design for the future six-laning of PTH 100 is required with separate structures for each direction of travel. The conceptual design may propose all new structures or incorporate the existing structure if feasible and there is sufficient service life left in the structure to be economically viable.
   - An AT functional design is required to relocate the Harte Trail crossing of PTH 100 to this interchange to improve safety.

5. Four Mile Road / Wyper Road Intersection
   - A roadway functional design for an interchange at Wyper Road to replace the existing at-grade intersection
   - A conceptual design for the interchange structure(s) that would be associated with the PTH 100 / Wyper Road interchange.
   - Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

6. CEMR Carman Subdivision Intersection
   - A roadway functional design for a grade separation at CEMR Carman Subdivision to replace the existing at-grade intersection.
   - A conceptual design for a railroad grade separation at the CEMR Carman Subdivision crossing. Separate structures will be required in both directions of travel if PTH 100 overpasses the CEMR Carman rail line.
   - Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.
   - A railway relocation functional design is required to investigate the potential relocation of the railway due to space constraints associated with an interchange at Wyper Road and PTH 3.

7. PTH 3 Intersection (McGillivray Boulevard)
   - A functional design for an interchange at PTH 3 (McGillivray Boulevard) / PTH 100 to replace the existing signalized at-grade intersection. The interchange is to be designed for a two-lane PTH 3 initially (if supported by acceptable traffic operations) that can be upgraded to a four-lane PTH 3 when warranted. The FD shall consider utilizing the existing location of PTH 100 as well as a new location for PTH 100. As part of this FD, PTH 2’s connection to PTH 100 will be closed (no PTH 2 direct access to PTH 100).
- **A preliminary design** for the interchange structure(s) that would be associated with the PTH 3 / PTH 100 interchange. If PTH 3 overpasses PTH 100, separate structures will be required along PTH 3 when it is upgraded to four-lanes.
- Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

8. Road 8E Intersection
- A roadway functional design for an interchange at Road 8E to replace the existing at-grade intersection.
- A conceptual design for the interchange structure(s) that would be associated with the PTH 100 / Road 8E interchange.
- Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

9. CPR La Riviere Subdivision
- A roadway functional design for a grade separation at CPR La Riviere Subdivision to replace the existing at-grade intersection.
- A conceptual design for a railroad grade separation at the CPR La Riviere Subdivision crossing. Separate structures will be required in both directions of travel if PTH 100 overpasses the CPR La Riviere rail line.
- Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

10. PR 330 Intersection
- A functional design for an interchange at PTH 100 / PR 330 to replace the current signalized at-grade intersection. The FD shall incorporate a connection from PR 330 to Brady Road Landfill.
- A conceptual design for the interchange structure(s) that would be associated with the PTH 100 / PR 330 interchange. Separate structures will be required in both directions of travel if PTH 100 overpasses PR 330.
- Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

11. Kenaston Boulevard Intersection (future proposed St. Norbert Bypass connection)
- A functional design for an interchange at PTH 100 / Kenaston Boulevard to replace the existing signalized at-grade intersection that would allow for a future proposed St. Norbert Bypass to connect into it from the south.
- A conceptual design for the interchange structure(s) that would be associated with the PTH 100 / Kenaston Boulevard interchange. Separate structures will be required in both directions of travel.
- Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.
• Existing and planned AT facilities within the area (i.e. within the Waverly West development) that connect to or cross PTH 100 should be considered.
• The existing at-grade signalized intersection at PTH 100 / Waverley Street is going to be closed permanently due to spacing constraints once the Kenastown Boulevard interchange is constructed, regardless of whether or not the proposed St. Norbert Bypass is constructed. While no analysis of this intersection is required, the traffic that uses this facility will need to be redistributed onto the network.

12. CN Letellier Subdivision (Bridge Site No.: 2897-00)
• The conceptual design of modifications to the CN Letellier Subdivision grade separation that may be required as a result of proposed modifications to the PTH 75 interchange.
• Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

13. PTH 75 Interchange (Pembina Highway, Bridge Site No.: 2898-00)
• A functional design for modifying the PTH 100 / Pembina Highway interchange that would eliminate the growing traffic operational issues related to the short weaving distances associated with the current cloverleaf interchange. The FD shall also consider modifications to the existing ramps to meet current standards.
• The conceptual design for modifications that may be required to the existing PTH 100 / Pembina Highway interchange structure as a result of proposed modifications to the interchange and the future six-laning of PTH 100.
• Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

14. Red River Crossing (Bridge Site No.: 2923-00)
• Establishing an alignment for the eastbound and westbound lanes of PTH 100 between PTH 75 (Pembina Highway) and PR 200 (St. Mary’s Road) that would allow for its transition from a concrete safety barrier median at PTH 75 to a depressed rural median at PR 200, as well as its future six-laning. For the initial four-lane stage, the current bridge across the Red River shall be used without modification, but provisions for future six-laning should consider separate structures for each direction of travel.
• Conceptual bridge designs should be prepared for the twin structures to identify cost implications of slope stabilization, settlement mitigation, hydraulic requirements, alignment constraints, and construction staging of a major crossing over the Red River.
15. PR 200 Intersection (St. Mary’s Road)
   • A functional design for an interchange at PTH 100 / St. Mary’s Road to replace the current signalized at-grade intersection. The interchange is to be designed for a two-lane PR 200 initially (if supported by acceptable traffic operations) that can be upgraded to a four-lane PR 200 when warranted.
   • A preliminary design for the interchange structure(s) that would be associated with the PTH 100 / St. Mary’s Road interchange. Separate structures will be required for each direction of travel if PTH 100 overpasses PR 200.
   • Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.
   • The FD will need to consider the requirements for service road connectivity between PR 200 and St. Anne’s Road, including access provisions to the South Winnipeg Treatment Plant.

16. St. Anne’s Road Intersection
   • A functional design for an interchange at PTH 100 / St. Anne’s Road to replace the current signalized at-grade intersection.
   • A conceptual design for the interchange structure(s) that would be associated with the PTH 100 / St. Anne’s Road interchange. Separate structures will be required for both directions of travel if PTH 100 overpasses St. Anne’s Road.
   • Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

17. Seine River Crossing
   • A conceptual design for replacing / modifying the Seine River crossing structure.
   • Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.
   • The FD will need to consider the requirements for service road connectivity between St. Anne’s Road and PTH 59, which may result in additional structures across the Seine River.

18. CPR Emerson Subdivision
   • A roadway functional design for a grade separation at CPR Emerson to replace the existing at-grade intersection and any other at-grade crossings related to the internal road network redevelopment.
   • A conceptual design for a railroad grade separation at the CPR Emerson Subdivision crossing. Separate structures will be required for both directions of travel. The conceptual design should evaluate the need for a through-pass connection between Melnick Road and Budd Road (north and south of PTH 100).
   • Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.
• The FD shall identify the required internal roads / service roads to provide land adjacent to PTH 100 with access locations while eliminating the direct access to PTH 100 from Budd Road, Aimes Road, Sumka Road, and Melnick Road.

19. PTH 59S Interchange (Lagimodiere Boulevard)
• A roadway functional design for modifications to the PTH 100 / PTH 59 interchange that would eliminate the growing traffic operational issues of the interchange and account for the future six-laning of PTH 100.
• The conceptual design for modifications that may be required to the existing PTH 59S / PTH 100 interchange structure for the future six-laning of PTH 100. Separate structures will be required for both directions of travel.
• Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

20. Symington Road Intersection
• A roadway functional design for an interchange at Symington Road to replace the existing at-grade intersection. The FD shall identify the required internal roads / service roads required to provide adjacent land access locations while eliminating direct access to PTH 100 from Plessis Road and Murdock Road.
• A conceptual design for the interchange structure(s) that would be associated with the PTH 100 / Symington Road interchange. Separate structures will be required for both directions of travel if PTH 100 overpasses Symington Road.
• Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

21. CN Sprague Subdivision (Bridge Site Nos.: 2993-00 and 2993-03)
• A functional design for modifying the CN Sprague Subdivision grade separation structures that would allow for its future six-laning and would complement the proposed interchange modifications at PTH 1E.
• A conceptual design of the grade separation structure(s) that would be associated with the modification required at the PTH 1E interchange. Separate structures will be required in both direction of travel under the six-lane configuration.
• Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

22. PTH 1E Interchange (Fermor Avenue)
• A functional design for modifications to the existing PTH 1E / PTH 100 interchange that would allow for its future six-laning and eliminate growing traffic operational issues related to the short weaving distances associated with the current cloverleaf interchange.
• A conceptual design of the interchange structure(s) that would be associated with the modification required at the PTH 1E interchange for the future six-
laning of PTH 100. Separate structures will be required in both directions of travel under the six-lane configuration.
- Both the four-lane interim and six-lane ultimate cross-sections should be considered in the above.

Additional Requirements
In addition to the information above, the PTH 100 Reconstruction F/PDS will require:
- Determination of the long-term cyclist / pedestrian accommodation requirements throughout the Study Area to identify new routes, connectivity to existing routes, as well as new / modified structures and land requirements.
- Undertake an assessment of highway traffic related noise within the Study Area and, where appropriate, propose mitigations to bring noise level to more acceptable levels based on Department guidelines.
- Undertake an assessment of the entire highway corridor within the Study Area to determine the appropriate amount and location of illumination.
- Coordination with the City of Winnipeg with respect to existing transit routes and potential future routes / accommodations.
- Determination of how to appropriately accommodate the following atypical highway users:
  - Agricultural vehicles, including large implements and trains
  - Over-dimensional vehicles / loads
  - Highway maintenance vehicles / equipment and operations
  - Emergency vehicles
- Retain an independent third party Engineering Consultant to undertake a road safety audit of the proposed design consistent with TAC’s established process prior to finalization of the design and the study report.

Proposed St. Norbert Bypass

Overview
The FDS of the proposed St. Norbert Bypass shall be a separate report apart from the PTH 100 Reconstruction F/PDS. The Proposed St. Norbert Bypass FDS will result in a functional design for the proposed St. Norbert Bypass that includes a new multi-lane divided expressway between PTH 100 / Kenaston Boulevard and PTH 75 south of the community of St. Norbert.

Cross-Sections
As with the PTH 100 Reconstruction F/PDS, cross-section consistency throughout the proposed St. Norbert Bypass alignment is ideal. While some work has been undertaken within the Department on cross-section elements, most of the work remains to be done by the Proponent. The intention is for the proposed St. Norbert Bypass to be a four-lane divided limited access expressway.
Access Management
The proposed St. Norbert Bypass will begin with an interchange at its southern terminus with PTH 75 and end with an interchange at its northern terminus with PTH 100 (at Kenaston Boulevard). Between these termini, the proposed St. Norbert Bypass will sever portions of the existing local road network. As part of this study, the Proponent will be required to develop an access management plan that meets Department requirements while also providing ingress / egress to the existing development in the Study Area that is acceptable to the City of Winnipeg.

A connecting roadway network is therefore required that would direct all local road and service road traffic to the proposed interchanges on PTH 100, the access connection(s) on the proposed St. Norbert Bypass, or to intersections on PR 330, PR 247, and Pembina Highway when the proposed St. Norbert Bypass moves towards construction.

Intersections / Interchanges and Other Accesses
As part of this study, the determination of appropriate access types and locations will be made along the entirety of the proposed St. Norbert Bypass alignment. While interchanges are required on PTH 100 and PTH 75 at the northern and southern termini of the proposed Bypass, at-grade intersections may be permitted at other locations between these limits if supported by acceptable traffic operations.

Structures
All structures designs associated with interchanges along the proposed St. Norbert Bypass alignment will be to a conceptual level (no structures preliminary designs are required for the proposed St. Norbert Bypass project). While the presence of additional interchanges between the termini is not yet known, a conceptual design for the structure(s) associated with the southern terminus of the proposed St. Norbert Bypass (new PTH 75 interchange / CN Letellier Subdivision grade separation) is required.

A conceptual design for the LaSalle River Crossing of the proposed St. Norbert Bypass is also required.

Any additional structures along the proposed St. Norbert Bypass not listed above will also require a conceptual design.

Additional Requirements
In addition to the information above, the proposed St. Norbert Bypass FDS will require:
- Determination of the long-term cyclist / pedestrian accommodation requirements throughout the Study Area to identify new routes, connectivity to existing routes, as well as new / modified structures and land requirements.
- Undertake an assessment of highway traffic related noise within the Study Area and, where appropriate, propose mitigations to bring noise level to more acceptable levels based on Department guidelines.
• Coordination with the City of Winnipeg with respect to existing transit routes and potential future routes / accommodations.
• Determination of how to appropriately accommodate the following atypical highway users:
  o Agricultural vehicles, including large implements and trains
  o Over-dimensional vehicles / loads
  o Highway maintenance vehicles / equipment and operations
  o Emergency vehicles
• As the proposed Bypass is intended, in part, to facilitate the ease of freight / heavy truck movement through the Community of St. Norbert, the proposed Bypass should have the same level of service PTH 75 and PTH 100.
• Retain an independent third party Engineering Consultant to undertake a road safety audit of the proposed design consistent with TAC’s established process prior to finalization of the design and the study report.
• The following constraints are known to the Department, and the successful Proponent will be required to avoid, and if not possible minimize to the greatest extent possible, impacts to the Manitoba Hydro substation, Southwood Golf Course, and Brady Road Landfill.

Public Engagement Program
As part of the PTH 100 Reconstruction F/PDS and proposed St. Norbert Bypass FDS, the Proponent will be required to undertake a landowner, stakeholder, local government, and public engagement program for the purposes of obtaining input from directly affected landowners, stakeholders, local governments, and the general public regarding the changes being proposed for PTH 100, the proposed St. Norbert Bypass, and access changes and, where appropriate, propose mitigations to address concerns raised.

• The Department believes that an important component of the engagement program will be working with the municipalities to develop an alternative arrangement for closing the at-grade intersections on PTH 100 that both they and the Department can support.
• The Proponent’s proposal shall thoroughly describe their proposed engagement program, identifying the type of process to be used and how the various groups will be engaged.
• The program must be tailored to consider the interests and concerns of four different groups: directly affected landowners (people whose land may be needed, etc.), stakeholders (groups who may have a vested interest in the highway; trucking associations, police, emergency responders, etc.), local governments (RM Councils, City of Winnipeg, etc.), and the general public.
• The program must allow for direct interactions with directly affected land owners.
• Interaction with stakeholders may be in person, telephone interviews, correspondence, etc.
• The program must allow for a minimum of three meetings with local government councils: input gathering, alternative presentations, and the presentation of the preferred alternative.
• There should be a minimum of two public open houses for the general public for each project: alternative presentation / input gathering, and preferred alternative presentation. The Proponent may hold these open houses concurrently or separately.
• The Proponent may be required to give formal / informal presentations to MI’s Minister and/or Deputy Minister towards the conclusion of the studies.

**Traffic Analysis**

A complete traffic analysis of the entire South Perimeter Highway is required. The analysis will include all of PTH 100 from the north functional limit of the PTH 1W (Portage Avenue) interchange to the north functional limit of the PTH 1E (Fermor Avenue) interchange.

• Traffic projections shall be 10-, 20-, and 30-year projections from the study completion date.
• The analysis is to include AM and PM peak periods, as well as AADT, SADT, and AADTT, along PTH 100 and all connecting roadways, including all interchange ramps. Interchange merge, diverge, and weave analysis consistent with the Highway Capacity Manual (HCM) will also be required (as applicable). Synchro analysis will be required for all signalized intersections.
• Intersection / turning volumes will be required at PTH 1W (Portage Avenue), PR 427 (Wilkes Avenue), Four Mile Road / Wyper Road, PTH 3 (McGillivray Boulevard), Road 8E, PR 330, Kenaston Boulevard, PTH 75 (Pembina Highway), St. Mary’s Road (PR 200), St. Anne’s Road, PTH 59S, Symington Road, and PTH 1E (Fermor Avenue)
  o Traffic analysis of the PR 241 (Roblin Boulevard) interchange was completed in a previous study and is not anticipated to be required as part of the traffic analysis for this study.
• The analysis shall take into consideration expected population growth and development patterns in the general area.
• Manitoba Infrastructure has made arrangements with the City of Winnipeg for the use of its traffic model to assist in this exercise.
• A collision history analysis will be required along the entire PTH 100 corridor and all its connections within the Study Area. The analysis will be used to determine hot spot locations on the South Perimeter and assist in producing alternatives that seek to reduce / mitigate future collisions.

The traffic analysis for the proposed St. Norbert Bypass will not be as extensive as the PTH 100 traffic analysis, but the output is nonetheless important in determining the preferred alternative for the proposed Bypass. The analysis will include all of the proposed Bypass from PTH 100 (at Kenaston Boulevard) to the PTH 75 connection.
• Traffic projections shall be 10-, 20-, and 30-year projections from the study completion date.
• The analysis is to include AM and PM peak periods, as well as AADT, SADT, AADTT, along the proposed Bypass and all connecting roadways including all interchange ramps. Interchange merge, diverge, and weave analysis consistent with the Highway Capacity Manual (HCM) will also be required (as applicable). Synchro analysis will be required for all signalized intersections.
• Intersection / turning volumes will be required at Kenaston Boulevard, all other proposed connections along the proposed Bypass, and PTH 75. As well, traffic volumes over the Seine River will also be required.
• The analysis shall take into consideration expected population growth and development patterns in the general area.

**Environment Impact Assessment**
An Environmental Impact Assessment (EIA) shall be undertaken for the PTH 100 Reconstruction F/PDS from the north functional limit of the PTH 1W / PTH 100 interchange to the north functional limit of the PTH 1E / PTH 100 interchange.
• The EIA report shall contain sufficient information to be suitable for use as a supporting document in a Manitoba Environmental Act licensing process, should one be required.
• The EIA report for PTH 100 shall be a standalone report.

The proposed St. Norbert Bypass does not require a standalone Environmental Impact Assessment report suitable for use in the Manitoba Environment Act licensing process at this time as this project is not expected to proceed in the near future. However, environmental impacts must be assessed and considered in the functional design of the proposed Bypass and that information is to be included in the proposed Bypass FDS.

5) **Work Activities**

a) **Gain a Thorough Understanding of Existing Conditions**
• Identify property boundaries and landowners relevant to this study.
• Obtain topographic information relevant to this study.
• Locate and identify existing and planned utilities (above and below ground) that may be relevant to this study.
• Obtain existing land development information and available information on proposed development plans that may impact decisions relevant to this study.
• Locate all existing roads in the Study Area and assess their condition, as may be relevant to this study.
• Obtain available information regarding the transportation plans of the local governments in the Study Area, as may be relevant to this study.
• Obtain or determine existing hydrological and land drainage information of the Study Area, including culvert capacities and conditions, as may be relevant to this study.
• Locate all existing road / rail crossings in the Study Area and, as may be relevant to this study, obtain information regarding condition, usage, etc. Determine existing and future track requirements at all existing and proposed rail crossings.
• Identify both historical and potential linear and crossing usage of PTH 100 and its R/W by cyclists and pedestrians.
• Develop an understanding of the potential environmental concerns for the Study Area.
• Develop an understanding of existing traffic and projected volumes for the Study Area.
• Develop an understanding of the collision history along PTH 100 and its connecting roadways.
• Review existing structures documentation and site conditions for all structures.
• Structures requiring preliminary designs require the following (see TOR Appendix 1 – Structure Requirements for further details):
  o Site inspection with MI staff in attendance.
  o Bridge survey performed in accordance with the Bridge Survey Manual.
  o Geotechnical investigation.
  o Review of MI in-house files.
• Structures that have not been identified for Preliminary Design, but are proposed to be modified for interim use until PTH 100 is expanded to 6-lanes require the following:
  o Review of MI in-house files.
  o Site inspection with MI staff in attendance.
  o Additional inspections by the Proponent to familiar the Proponent with the structure and site conditions.

b) Gain a Thorough Understanding of the Structures and Roadway Design Requirements

• Obtain copies of the Department’s roadway, structural, and hydrological design standards / guidelines / practices, as may be relevant to this study.
• Obtain copies of the local government’s roadway, structural, and hydrological design standards / guidelines / practices, as may be relevant to this study.
• The Proponent should standardize the proposed roadway cross-sections and maximize structures commonality to the greatest degree possible to reduce design and construction costs through the use of repeatable structural elements. Repeatable designs should be proposed where possible for both conceptual and preliminary designs throughout the Study Area.
• Refer to TOR Appendix 1 – Structure Requirements and TOR Appendix 2 – Roadway Requirements for additional information.
• Determine, interactively with Department engineering staff, the evaluation criteria to be used during the evaluation screening process to arrive at the preferred alternative.
c) Develop a Set of Viable Roadway Alternatives

- For PTH 100, develop initial highway alignment alternatives to a single line functional design level that, at a high level, would meet the design requirements (see TOR Appendix 2 – Roadway Requirements). The EIA for PTH 100 should consider a screening level evaluation of all alternatives, and a detailed evaluation of the selected alternative.
- The alternatives must address the closure of the at-grade intersections on PTH 100, and which service roads / local roads would be upgraded to direct local traffic to the interchanges. In developing the service / local road upgrading concepts, work interactively with Department engineering staff to arrive at a set of viable alternatives (2-3 alternatives). The Department expects that one of the challenges in gaining support of the local governments would be closing the local road at-grade intersections with PTH 100, and the impact that it would have on other roads in the municipality.
- For the proposed St. Norbert Bypass, develop initial highway alignment alternatives to a single line functional design level that, at a high level, would meet the design requirements (see TOR Appendix 2 – Roadway Requirements). While an EIA is not required for the proposed St. Norbert Bypass at this time, the Proponent shall still consider environmental effects when developing alignment alternatives.
- For new interchanges, develop single line alternatives that at a high level would meet the design requirements. In developing these alternatives, work interactively with Department engineering staff to arrive at a set of viable alternatives (2-3 alternatives). Emphasis should be placed on solutions that meet the design and operational requirements as economically as possible.
- Develop conceptual structure designs for structure modifications and for each new structure that would be required (see TOR Appendix 1 – Structure Requirements for a definition of conceptual design).
- The Proponent should standardize the proposed roadway cross-sections and maximize structures commonality to the greatest degree possible to reduce design and construction costs through the use of repeatable structural elements. Repeatable designs should be proposed where possible for both conceptual and preliminary designs throughout the Study Area. The structures conceptual design should be presented to MI for their review and comment. Based on the input received, refine the alternatives as appropriate before evaluation.

d) Evaluate Alternatives and Select the Preferred Roadway Alternative:

- Work with Department engineering staff to confirm the set of evaluation criteria remain an acceptable reflection of the interests of the government, directly affected land owners, stakeholders, and the public.
- Undertake comprehensive assessment of the alternatives against the evaluation criteria, and select a preferred alternative.
e) Refine the Preferred Roadway Alternative to the Functional Design Level:

- With Department approval, develop the preferred highway / interchange and local road alternative to the functional design level.
- With Department input, develop maintenance of traffic (MOT) plans for the construction of each interchange and the reconstruction of PTH 100.
- Define right-of-way requirements based on the preferred functional design and Department R/W requirements.
- Identify utilities that may need to be relocated and potential locations for the utilities to be relocated to.
- Develop a drainage plan to a functional level that identifies how drainage for PTH 100 and the interchanges would be accommodated.
- Develop a preferred cycling and pedestrian plan that, in conjunction with the functional design for PTH 100 and the proposed St. Norbert Bypass, identifies how and where integration of those facilities should be considered.
- Develop a highway traffic noise mitigation plan to a functional level that identifies locations and preferred methods of mitigating traffic noise.
- Develop a highway guide signing plan for PTH 100 and the proposed St. Norbert Bypass to a functional level.
- Develop a cost estimate for the preferred alternative (Class C for structures and Class B for roadways), including proposed cash flows by fiscal year for the PTH 100 reconstruction through to completion.
- The Proponent shall attempt to gain resolutions in support of the study recommendations from the local governments in the Study Area.
- Undertake a safety audit of the PTH 100 and proposed St. Norbert Bypass functional designs.

f) Develop a Set of Viable Structure Alternatives, Evaluate and Make Recommendation

- Develop designs of viable new bridge alternatives (PTH 3 and PR 200 Interchanges).
  - The Proponent shall identify all competitively viable alternatives with a minimum of 3 structure alternatives developed for evaluation for each site.
  - Each alternative should also include or consider traditional black reinforcing steel versus new generation reinforcing steel such as ACM, MMFX, galvanized, and stainless steel as part of the deck system.
  - Continuous structures shall have an asphalt wearing surface.
- Develop evaluation criteria for the structure alternatives. At a minimum, the evaluation criteria should consider:
  - First cost and Life Cycle Costs (LCC),
  - Ease of constructability, construction schedule, and construction risk,
  - Inspection,
  - Maintenance,
  - Ease of future repairs / rehabilitation,
  - Level of service.
• The Proponent shall meet with MI to present the proposed alternatives and evaluation criteria. MI will assess if the alternatives are viable and / or identify if competitively viable alternatives exist that must be considered.
• Evaluate the alternatives and select a Draft Recommend Alternative for each site.
• Present the Draft Recommended Alternative to MI for review, discussion and comment.
• Refine the alternative (if required) and make a Final Recommended Alternative.
• Complete the preliminary design and detailing of the Final Recommended Alternative for the PTH 3 and PR 200 interchange structures.
• Construction staging and Maintenance of Traffic plans are also considered part of the preliminary design.
• Architectural concepts and features for the proposed structures shall be consistent with the features developed for the PTH 100 / PR 241 and PTH101 / PTH 8 Grade Separation Structures.
• Include discussions and input from contractors on constructability issues, schedule, cost, temporary works, etc. if necessary. MI shall be in attendance for all meetings or discussions with contractors.

g) Document the Study Findings in Reports

• A separate, standalone report will be required for the PTH 100 Reconstruction Functional Design Study. The report will document the work undertaken in the study, including the investigation and analysis undertaken, standards used, public engagement process, and alternatives considered, along with conclusions and recommendations. Conceptual designs for all structures pertaining to this assignment shall be included in this report. Reference shall be made to the two Preliminary Design Reports required at PTH 3 and St. Mary’s Road (PR 200).
• A separate standalone report will be required for the proposed St. Norbert Bypass Functional Design Study. The report will document the work undertaken in the study, including the investigation and analysis undertaken, standards used, public engagement process, and alternatives considered, along with conclusions and recommendations. Conceptual designs for all structures pertaining to this assignment shall be included in this report.
• For structures requiring preliminary designs, a separate standalone report for each structure shall be prepared (for details on the report refer to TOR Appendix 1 – Structure Requirements). The preliminary design report shall describe the work undertaken by the Proponent, alternatives that were analyzed, summary of any life cycle cost analysis for each of the options, and the final recommendation for the structures.
• Each report shall be a concise standalone document that includes sufficient information with enough detail to satisfy a technical audience of knowledgeable transportation professionals.
• Prepare two separate, standalone Safety Audit Reports, one for each of the FDS listed above.
• Prepare a separate, standalone Access Management Plan / Report using only information contained in the PTH 100 Reconstruction F/PDS. The Department will use the standalone Access Management Plan in discussions with adjoining municipalities, land owners, and other interested parties.
• Prepare a PTH 100 Reconstruction Environmental Impact Assessment, for MI submission to Sustainable Development (SD), which meets all SD requirements.

6) Deliverables

• Five hard copies of each of the final reports and their appendices, including
  o PTH 100 Reconstruction Functional Design Study
  o PTH 100 / PTH 3 Structures Preliminary Design Report
  o PTH 100 / St. Mary’s Road (PR 200) Structures Preliminary Design Report
  o PTH 100 Reconstruction Environmental Impact Assessment
  o PTH 100 Reconstruction Access Management Plan / Report
  o PTH 100 Reconstruction Safety Audit
  o Proposed St. Norbert Bypass Functional Design Study
  o Proposed St. Norbert Bypass Safety Audit
• One electronic version of each final report and appendices that is an exact duplicate of the hard copy report shall be provided in a printable PDF format.
• One set of reproducible Mylar drawings of the engineering drawings produced for the report.

7) Department Responsibilities

• Provide copies of, or access to, readily available Department drawings and other relevant information in the Study Area that the Department may have access to.
• Provide copies of relevant Department standards, policies, and practices.
• Provide preliminary pavement designs to the successful Proponent for design and cost estimating purposes.
• Provide access to the University of Manitoba Transport Information Group (UMTIG) for existing traffic data.
• Provide copies of access permits with relevant conditions.
• Provide copies of available collision data.
• Provide access to available files related to the existing structures, such as structure design notes, soil information, construction records, inspection records, maintenance records, drawings, load ratings, and photographs. Files will be made available for review and copies, but no original information shall be removed from MI offices.
• Provide LiDAR data the Department has captured for use by the successful Proponent. MI currently has data along PTH 100 from PTH 1W to PTH 75, and that information will be provided to the successful Proponent. MI will be acquiring additional LiDAR data along PTH 100 from PTH 75 to PTH 1E and the proposed St. Norbert Bypass corridor this autumn.
That data set will be provided to the successful Proponent as available (tentatively January 2018). Any additional survey data required for this assignment, including bridge surveys, will be the responsibility of the successful Proponent.

8) **Department Management and Review**

Day-to-day management of the project will be by MI’s Highway Planning and Design Branch (HPD). There will be a Department Project Steering Committee (PSC) consisting of MI Executive, Directors, and senior engineers who will provide strategic direction, support, and decision-making for this project as well as HPD. At a minimum, PSC meetings will be held at the following milestones:

- Kickoff meeting prior to commencing work to confirm and ensure that there is a common understanding of the process, expected results, and schedule.
- Completion of data assessment and analysis to review analysis findings.
- Completion of the development of the alternatives for the purposes of obtaining Department consensus that the alternatives meet Department expectations and are acceptable for presenting to the public.
- Completion of the evaluation of the alternatives for the purposes of obtaining Department consensus on the preferred alternative.
- Completion of the first draft of the final report and all plans and illustrations to review the content and format of the primary deliverables.

In the event MI’s Minister and/or Deputy Minister require a presentation, an additional PSC meeting would be required to review and comment on the presentation’s content, message, and delivery.

In addition, a Technical Advisory Committee (TAC) consisting of approximately 20 technical experts from within MI will be established to provide technical direction to the successful Proponent and support to the PSC. Review meetings will be held with Department technical experts on an as-required basis in order to obtain direction regarding the application of Department standards / policies / practices.

9) **Payment**

- This is a lump sum contract with the lump sum price to be inclusive of all labour, professional fees, subcontractor fees, materials, disbursements, and applicable taxes.
- Interim payments will be made based on the work being satisfactorily completed for project milestones identified in the proposal, and agreed to by the Department.
- The interim payments requested for each milestone must be representative of the actual work required to reach the milestone.

10) **Schedule**

The project is to be completed within 2 years of award.
TOR Appendix 1 - Structure Requirements

Design Guides
The Proponent shall abide by the following design codes, standards, guidelines, requirements, policies and manuals:

- MI’s “Structures Design Manual” (latest version)
- MI’s Water Management and Structures Standard and Typical Details
- MI’s Water Control and Structures CADD Standards Manual (latest version)
- MI’s WCS CADD Standards (latest version)
- MI’s “ESP Engagement and Administration Manual” (latest version)
- Manitoba Workplace Safety and Health Act and Regulations (latest edition)
- MI’s “Manitoba Work Zone Traffic Control Manual – Provincial Roads and Provincial Trunk Highways” (latest edition)
- And all codes, standards, guidelines, requirements, policies, and manuals listed in TOR Appendix 2 – Roadway Requirements.

General Design Requirements
All structures on PTH 100 and the proposed St Norbert By-Pass shall be designed to the following minimum requirements:

- Identify and complete any surveying requirements at the proposed interchanges including the detour approaches and the bridge approaches. **Note: Survey is only required for Preliminary Designs.** The preliminary designs should provide a profile of the final riding surface over the new structures works.

- For structures on water courses requiring replacement, complete the following hydrologic / hydraulic design:
  - Hydraulic analysis and design. Carry out all hydraulic analyses to determine the required hydraulic opening, as well as the need for temporary and permanent erosion control measures.
  - The design shall be based on a consideration of the following parameters:
    - Q1% Annual Flow Frequency
    - Q50% Summer Flow Frequency
    - Fish Passage Requirement for the 3dQ10% flow
    - Highest Water Levels Recorded
    - Historical record flows
  - The recommended alternative must meet the Department’s hydraulic design standards.
• Geotechnical investigation and design:
  - Carry out a geotechnical and hydro-geotechnical assessment and establish design parameters for the foundations and embankments, including any parameters necessary for slope stabilization design (temporary and permanent) and settlement mitigation. The assessment shall include a detailed site investigation to obtain sufficient information to complete the Preliminary Design and the subsequent Detailed Design of the geotechnical aspects of the proposed new structures at this site (Note: Detailed design will require a minimum of 1 borehole at each proposed substructure location). The site investigation shall be developed by the Proponent and shall include a minimum of three boreholes of sufficient depth for deep foundation design. Where bedrock is encountered boreholes shall be drilled to a depth of at least 3m into the underlying limestone bedrock. The bedrock shall be cored and the cores retained for visual examination. Suggested locations for these boreholes are near the abutments and in the vicinity of the center of the structure. All boreholes drilled shall be sampled at 1.5m intervals, alternating the sampling with undisturbed and Standard Penetration Test samples as far as practicable. During and subsequent to the site investigation, establish the water table elevation and monitor the water elevation during the course of the project. Test all the samples in the laboratory for moisture content and carry out a sufficient number of soil classification and strength tests to fully characterize the geotechnical properties of the various strata. Where artesian conditions are encountered, the artesian zone shall be instrumented to obtain an accurate measurement of the hydraulic head. Note: Investigations are not required for conceptual designs.
  - Identify any requirements for embankment preparation that may be required to mitigate settlement (i.e.: preloading, surcharge, wick drains, light weight fill, construction staging, etc.).
    - Prior to placing any surfacing materials on the base course, a minimum of 90% of primary consolidation, calculated by the Proponent, shall be achieved in order to minimize differential roadways settlements at the bridge and aid in the minimization of downdrag forces on the piles. The Proponent shall present their proposed approach to address downdrag forces on the piles which may include coating of the piles.
    - Differential settlements between the finished roadway surface (i.e. after paving) and adjacent structures must be less than 25 mm for a distance of at least 10 m from the free end of the approach slab to the structure.
    - The Proponent shall include in their design the construction staging necessary to mitigate settlement (where necessary), and identify the need for a detailed monitoring program to ensure construction
of the embankment and consolidation proceeds in accordance with the design.

- Complete slope stability assessment and design for the channel slopes and embankment slopes including any realigned roadways.
  - The analysis shall include an assessment of the hydraulic gradient of the site as it relates to slope stability.
  - Identify any requirements for slope stabilization that may be required to mitigate any existing or potential slope instabilities. The design shall provide a factor of safety (FS) of 1.3 for short term stability, and FS of 1.5 for long term stability. Where slope stabilization costs are estimated by the Proponent to exceed 10% of the overall project cost, an alternative design providing FS of 1.2 for short term stability and FS of 1.3 for long term stability shall be included. This alternative shall include any recommended measures, including but not limited to instrumentation and monitoring, to be taken to ensure stability can be maintained both during and post-construction.

- Propose appropriate foundation units for the structure. Where piles are proposed, establish the type, size, length, capacity and method of installation of the piles. Provide an estimate of the Ultimate Capacity of the piles and the appropriate reduction factor to obtain the Factored Ultimate Capacity. It is expected that the Proponent will carry out a Wave Equation Analysis for the proposed piles using locally available pile driving hammers in the hammer input requirement of the WEAP program. The Proponent may assume that the pile driving will be fully monitored. Also, estimate the settlement of the piles and quantify the impacts of pile downdrag in order to accurately assess the cost of the foundations.

- Identification of locations and systems for cofferdams and shoring (where applicable) is part of this assignment. Temporary and permanent excavations, foundations, slope stabilization works and settlement mitigation works shall prevent contamination of aquifers. Where depressurization of existing aquifers is proposed, sufficient information shall be provided for MI to make applications for a Water Rights License. This may include, but not be limited to: identification of ground water locations; quality of groundwater through laboratory analysis; and potential effects of groundwater depressurization.

- Any mechanically stabilized earth (MSE) retaining walls must be single stage type.

- Contact utility companies to identify existing utility plants and future requirements associated with the structure rehabilitation / new bridge works.
• New Structures - Loading, whichever governs:
  • Design Truck Load: Modified AASHTO HSS 30
  • Lane Loading: MS-30
  • HL-93 Loading
  • Truck Train Load Case: The 90% factor described in AASHTO LRFD 3.6.1.3 shall be replaced with 125% and applied to the two HL-93 Design Trucks and Lane Load as described in code.

• Structures to be rehabilitated or modified – Loading, whichever governs:
  • Design Truck Load: Modified AASHTO HSS 20
  • Lane Loading: MS-30
  • HL-93 Loading
  • Truck Train Load Case: The 90% factor described in AASHTO LRFD 3.6.1.3 shall be replaced with 100% and applied to the two HL-93 Design Trucks and Lane Load as described in code.

• Structure service life:
  • New structures: 75 Years.
  • Rehabilitated Structures: 30 Years.

• Clearances:
  • Rail - Vertical: As per Railway requirements, and a minimum of 7 metres.
  • Rail - Horizontal: As per Railway requirements.
  • Roadway: Vertical clearance shall be a minimum of 5.4 metres.

• Bridge Clear Roadway Width:
  • MI will provide the Preliminary Clear Roadway Width for the new or rehabilitated structures in the Study Area at the beginning of conceptual structures design.
  • The Proponent shall make an application for a Final Clear Roadway Width following the selection of the Draft Recommended Alternative. The preparation of the Final Clear Roadway width may require input from Highway Planning and Design, Traffic Engineering Branch and the local Regional Office.

• Where 4 or more lanes are required for the roadway (i.e. 2 lanes per direction), two independent structures are required – one for each carriageway. The two structures shall be a minimum of 5 metres apart.
Construction staging and traffic control plans are also considered part of the preliminary design. The proposed alternatives must provide the following minimums for traffic control during construction:

- One minimum traffic lane width of 3.7m in each direction for summer months construction and
- One minimum traffic lane width of 4.3m in each direction for winter months construction (if applicable).

Environmental Applications

- Submissions for all required Environmental approvals or authorizations (e.g., Department of Fisheries and Oceans [DFO], Transport Canada) will be undertaken by MI. MI anticipates that structure replacement options can be designed and completed under suitable Environmental Best Management Practices (EBMPs). The Proponent shall pursue reasonable construction methods that conform to or adapt existing EBMPs to ensure environmental protection. In the event that effective EBMPs cannot be adhered to the Proponent shall notify MI (in a timely manner) and present the reasons why this is not possible. MI can meet with the Proponent (as required) to discuss applicable EBMPs.
- Drawings and information shall be provided at the mid-point and end of the PD assignment in order for MI to complete an Environmental Assessment and determine which regulatory approvals are required. At a minimum, drawings and information shall include the following: details of construction, methodology, timing; map showing location of project; dimensioned ‘general arrangement’ drawing (e.g., location of proposed work, high and low water elevations, access points / routes, etc.); plan and profile views of proposed work (e.g., structure elevations; any temporary works and associated elevations); high water elevation (i.e., Q2).
- **Note:** Environmental Applications are not required for Conceptual Designs.

**Conceptual Designs**

For the purposes of this study, conceptual structure designs will identify the following structure attributes:

- Structure Centerline location,
- Superstructure depth,
- Structure length, number of spans and approximate span lengths,
- Structure headslopes,
- Structure width (roadway widths, allowance for hazard protection / bridge rail, estimates of active transportation requirements, etc.),
- Approximate substructure locations
- Vertical and horizontal clearance to structure for each road and rail element being crossed,
Allowances for hazard protection
Consideration of traffic staging, construction staging, and constructability.
Embarkment slopes, retaining walls, slope stabilization, and settlement mitigation works shall be developed in sufficient detail to ensure the feasibility of the concept proposed, identify construction staging, and schedule and develop Class C cost estimates.

**Department Responsibilities**
The following information will be made available to the successful Proponent in MI offices. Original files and drawings shall not be removed from MI offices:
- Design notes,
- As-Constructed drawings of the existing structure (General Arrangement Drawing will be provided with this RFP),
- Construction reports,
- Soils information for the site:
- Inspection reports (Most recent Level II inspection report will be provided with this RFP)
- Maintenance information
- Photographs
- Preliminary Recommended Clear Roadway Width

**Deliverables**
Preliminary Design Report shall include:
- Identify utilities relocation requirements
- Description and results of the information review, surveys, site investigations and engineering assessments (sub-consultant reports to be appended). All investigations and surveys shall be provided in MI standard formats. Surveys shall be provided in hard copy and electronic formats (raw data, MicroStation and PDF) for future use by MI or third party Engineering Consultants.
- Description of the development of the evaluation criteria and alternatives.
- Evaluation summary and Final Recommended Alternative.
- Detailed description and preliminary drawings of the recommended alternative, including all required bridge works, bridge approach roadway works, consolidation and/or slope stability works. Note: the roadway profile over the roadways and bridges shall be developed and presented in the report.
- Construction staging and traffic management plan that maintains two lanes of traffic in each direction during construction.
- Cost estimates:
  - Structure works, consolidation and/or slope stability works, and detours:
    Summary of the life cycle cost analysis for each of the options (if required) and a detailed cost estimate (Class “C”) of the accepted option.
  - Project / construction schedule identifying anticipated timelines and durations for subsequent detailed design and construction.
  - Supporting drawings and documentation required for environmental applications.
TOR Appendix 2 - Roadway Requirements

Design Guides

Geometric Design
- Manitoba Infrastructure (MI) *Geometric Design Guide Supplement* Sheets (commonly known as Blue Sheets)
- Transportation Association of Canada (TAC) *Canadian Roundabout Design Guide*
- American Association of State Highway and Transportation Officials (AASHTO) – *A Policy on Geometric Design of Highways and Streets*
- City of Winnipeg “Motor Vehicle Noise Policies and Guidelines”, October 11, 1984
- All codes, standards, guidelines, requirements, policies, and manuals listed under TOR Appendix 1 – Structure Requirements.

Traffic Engineering
- TAC *Manual of Uniform Traffic Control Devices for Canada*
- MI *Traffic Signing Manual for Permanent Traffic Signing*
- MI *Roadside Safety Manual*
- MI *Work Zone Traffic Control Manual*
- Transport Canada Grade Crossing Standards
- AASHTO *Roadside Design Guide*
- TAC’s *Canadian Road Safety Audit Guide*
- AASHTO’s *Highway Safety Manual*

Functional Designs

For the purposes of the PTH 100 Reconstruction F/PDS:
- Cross-section designs will be required for PTH 100 and all connecting / crossing roadways within the Study Area as well as all other roadways that will form part of the connecting road network. While PTH 100 will be developed as both a four-lane and a six-lane cross-section, all other roadway cross-sections will be determined by traffic analysis based on acceptable traffic operations. Cross-sections will include the following:
  - Existing and proposed centerline
  - Number of Lanes and widths (4-lane and 6-lane)
  - Shoulder widths and surface treatments
  - Shoulder Edge Treatment (SET)
  - Sideslopes, ditch bottom, backslopes
  - Median width, treatment, and slopes
- Hazard protection (as required)
- Active Transportation (AT) provision
- Existing and proposed R/W
- Noise attenuation (as required)

- Conceptual alignment designs will include:
  - Single-line alignments, based on the cross-section centerlines, to aid the Project Team in determining which alternatives will be carried forward for further study as viable alternatives.
  - This is applicable to both PTH 100 mainline as well as the overpass / interchange configurations that will be studied as identified in the TOR.
  - The combination of the single-line concept alignments, cross-sections, and structures conceptual design should be sufficient to determine the toe of embankment at overpasses / interchanges and thus the overall footprint of a concept.

- Viable Alternative designs will include:
  - For PTH 100 mainline
    - Cross-section options that consider:
      - The need for local land access (via service roads or internal roads)
      - Spacing between opposing carriage ways and service roads
      - Active Transportation provisions
      - Which side to widen to and when
      - What to do at pinch points (such as existing structures that won’t be replaced in the near future)
      - Land requirements
      - Utility relocations
      - Maintenance of traffic during construction
      - MI typically likes to carry three (3) or more viable alternatives forward to the evaluation stage
  - For PTH 3 and PR 200 (St. Mary’s Road) Interchanges:
    - As these two locations will both have full Preliminary Designs completed for the structures (as opposed to conceptual designs which will be required at all other locations), the resulting level of detail / completeness of the roadway design is expected to be higher.
      - The Proponent will be expected to analyze traffic operations at these two interchange locations and use that output to support a recommendation that meets MI’s operational requirements in the most economical manner possible while still providing free-flow conditions on PTH 100.
      - At this stage, the entirety of the interchange should be visible in plan view with all lane lines, edge lines, centerlines, etc. clearly visible. As
well, all intersections should be designed to accommodate both the volumes and design vehicles anticipated.

- MI typically carries three (3) or more viable alternatives forward to the evaluation stage.
  - For all other Interchanges / Overpasses:
    - At all other interchange / overpass locations, functional designs will still be required, but they will be based on the conceptual structural design (no preliminary design) for the vertical profile.
    - As above, the Proponent will be expected to recommend alternatives that are cost-effective and contextually appropriate to both the location / land use and the traffic characteristics that will be using the facility.

- Preferred Alternative designs will include:
  - PTH 100 mainline from PTH 1W to PTH 1E
    - The final product should clearly indicate to MI and the Public where and how the South Perimeter Highway will lie within its R/W when it is reconstructed as a four lane divided access-controlled freeway, and ultimately expanded to a six lane divided access-controlled freeway.
    - All proposed R/W and individual property requirements will be clearly indicated.
    - All impacted utilities will be clearly indicated, as well as proposals as to where they should be relocated to (if applicable) or how to mitigate.
    - The design of PTH 100 will include both horizontal and vertical alignments.
    - All major lines/edges are to be shown in plan view, including but not limited to centerline, median widths, lane lines, shoulder lines, SET, toe of slope, ditching, ancillary features (such as AT trails), service roads and utility relocations.
  - At all Interchange / Overpass Locations
    - The final product should clearly indicate to MI and the Public what interchange configurations are proposed at each location, the movements they would permit / prohibit, the connecting road geometry / intersections, and the amount of R/W required for each.
    - All interchange / overpass designs will include both horizontal and vertical alignments.
    - The PTH 3 and PR 200 (St. Mary’s Road) interchange functional designs, which are paired with structures preliminary designs as part of this project, are to be developed to a sufficient stage that they can immediately progress to detailed design with no additional rework.
For the purposes of the FDS for the proposed St. Norbert Bypass:

- Cross-section designs will be required for the proposed Bypass and all connecting / crossing roadways within the Study Area as well as all other roadways that will form part of the connecting roadway network, and will include the following:
  - Existing and proposed centerline
  - Number of Lanes and widths
  - Shoulder widths and surface treatments
  - Shoulder Edge Treatment (SET)
  - Sideslopes, ditch bottom, backslopes
  - Median width, treatment, and slopes
  - Hazard protection (as required)
  - Active Transportation (AT) provision
  - Existing and proposed R/W
  - Noise attenuation (as required)

- Alignment designs will include:
  - Single-line alignments, based on the cross-section centerlines, to aid the Project Team in determining which alternatives will be carried forward for further study as viable alternatives.
  - This is applicable to both the proposed Bypass mainline as well as the overpass / interchange configurations that will be studied as identified in the TOR.
  - The combination of the single-line concept alignments, cross-sections, and structures conceptual design should be sufficient to determine the toe of embankment at overpasses / interchanges and thus the overall footprint of a concept.

- Viable Alternative designs will include:
  - For the proposed St. Norbert Bypass mainline
    - Cross-section options that consider:
      - The need for local land access (via service roads or internal roads)
      - Spacing between opposing carriage ways and service roads
      - Active Transportation provisions
      - Land requirements
      - Utility relocations
      - Maintenance of traffic during construction
      - MI typically likes to carry three (3) or more viable alternatives forward to the evaluation stage
  - For all Interchanges / Intersections / Overpasses:
    - All interchange / intersection / overpass locations will require functional designs that will be based on the conceptual structural design (no preliminary design) for the vertical profile.
The Proponent will be expected to recommend alternatives that are cost-effective and contextually appropriate to both the location / land use and the traffic characteristics that will be using the facility.

- Preferred Alternative designs will include:
  - Proposed St. Norbert Bypass mainline from PTH 75 to PTH 100
    - The final product should clearly indicate to MI and the Public where and how the proposed St. Norbert Bypass will lie within the Study Area.
    - All proposed R/W and individual property requirements will be clearly indicated.
    - All impacted utilities will be clearly indicated, as well as proposals as to where they should be relocated to (if applicable) or how to mitigate.
    - The design of the proposed St. Norbert Bypass will include both horizontal and vertical alignments.
    - All major lines/edges are to be shown in plan view, including but not limited to centerline, median widths, lane lines, shoulder lines, SET, toe of slope, ditching, ancillary features (such as AT trails), service roads and utility relocations.
  - At all Interchange / Intersection / Overpass Locations
    - The final product should clearly indicate to MI and the Public what interchange / intersection configurations are proposed at each location, the movements they would permit / prohibit, the connecting road geometry / intersections, and the amount of R/W required for each.
    - All interchange / intersection / overpass designs will include both horizontal and vertical alignments.

**General Design Requirements**

**Geometric Design**
- All alternatives development, evaluation, and preferred alternative designs (single-line through to full functional detail) shall be prepared on aerial photo background with property lines visible.
- Neither the South Perimeter Highway nor the proposed St. Norbert Bypass should be designed to absolute minimums. While the Department is seeking solutions that provide value for money, the use of successive minimum design values is to be avoided.

**Traffic Engineering**
- Safety audits will be required as identified in the TOR and will be in accordance with TAC’s *Canadian Road Safety Audit Guide*.
- MI has the following Level of Service (LOS) requirements:
  - Highway Mainline: LOS B desirable, LOS C acceptable
o Interchange Ramps: LOS C desirable, LOS D acceptable
  o Signalized Intersections: LOS C desirable, LOS D acceptable
• All barriers and hazard protection shall be in accordance with Traffic Engineering Branch policies, procedures, and guides. Hazard protection shall be included in all cost estimates.
• Illumination requirements along PTH 100 and the proposed St. Norbert Bypass shall be in accordance with Traffic Engineering Branch policies, procedures, and guides. Illumination shall be included in all cost estimates.

Materials Engineering
• Settlement options, including the use of wick drains, are to be analyzed, including cost and time requirements, for the proposed interchanges at PTH 3 and PR 200.

Property Services
• Identify all land acquisition requirements including owners, leases (if applicable), and acreages.