Attachment 2

Detroit River International Crossing Study

Consultant Scope of Services
for the Following Tasks

Task 2120 – Prepare Traffic Analysis Report

Task 2310 – Conduct Technical SEE Studies

Task 2810 – Conduct Initial Site Assessment (ISA)

Task 2820 – Conduct Preliminary Site Investigation (PSI) for Contamination

Task 3370 – Structure Study

Task 3520 – Hydraulic/Hydrologic Analysis

Task 3530 – Foundation Investigation

Detroit River International Crossing Study
Consultant Scope of Services

P/PMS Task 2120 – Prepare Traffic Analysis Report

Objectives

This task is described in three parts dealing with the application of: 1) the travel demand model; 2) the traffic operations approach; 3) the plaza analysis methods. Combined, these efforts will produce the information needed to:

- Develop Illustrative and Practical Alternatives – including analyses leading to the identification of the most effective location of transportation facilities and associated traffic forecasts.
- Identify traffic impacts of alternatives – including the impact on roadway and freight facilities supporting the international border crossing, and roadway interchange capacity issues.
- Identify key freight truck and rail mobility issues – including private sector control of transportation modal selection and routing decisions, trade volumes, international trade agreements, and economic forecasts.
- Evaluate alternatives – including an analysis of traffic and freight consequences of each alternative.
- Refine evaluation and documentation of the Recommended Alternative.
- Develop data to support an Interstate Access Justification Report (IAJR).
- Design the proposed plaza, customs, and toll operations facilities – including estimates of traffic volumes by vehicle type and time of day.

The traffic analysis task also will evaluate freight movements by truck and by rail. This will be accomplished by incorporating elements of the commodity flow analysis process used in the Detroit Intermodal Freight Terminal Study so changes in passenger car, truck, and rail are comprehensively evaluated in the context of the traffic study.

Background

Before addressing how to accomplish the objectives listed above, it is important to discuss the foundation of the P/N & F Study and SEMCOG models that are the basis for going forward. The Consultant is fully familiar with these techniques as a result of its working with the IBI Group on the Feasibility Study. The Consultant provided the IBI Group with data from the constituent models used on the U.S. side of the Detroit River. The Consultant also conferred with IBI on model development, particularly on time-of-day issues and issues concerning MDOT's statewide model and the SEMCOG model.

The IBI model draws heavily from four existing models:

- SEMCOG's Model – This model was SEMCOG's Tranplan model, which was the only version available at the outset of the effort. The Consultant has extensive experience with this model, and enhanced it in the I-75 (Oakland County) EIS to add transit networks and a nested logit model for mode choice and auto occupancy to allow the evaluation of transit alternatives and HOV. Since the time of the P/N & F, SEMCOG has developed a TransCAD-based model.
- MDOT's Statewide Model – The Consultant has used the statewide model and excerpts from it in several planning projects in Michigan, and is familiar with its operation. It is a TransCAD model.
- City of Windsor Model – This is a System II-based model covering the Greater Windsor Area.
- MTO's Truck Model – This is an Emme/2-based model focused on Ontario, but also covering North America.

Each of these models focuses on its particular study area, and does not include cross-border movements. Each model has different base years and horizon years. Common elements between the models are few, and there is little overlap of data. Thus, a new model was developed in the P/N & F Study from the four models to capture travel within the entire study area. Similarly, common trip tables for the designated study years (2000 and 2030) were built for the entire study area.

Information for cross-border vehicular demand forecasts and associated analyses in the Feasibility Study was obtained from two major data collection efforts.

- The Ontario-Michigan Border Crossing Traffic Study (August 2000) which collected 22,310 roadside surveys of passenger-vehicles crossing the Ambassador, Blue Water and Sault Ste. Marie Bridges and the Detroit-Windsor Tunnel.
- The Ontario Commercial Vehicle Survey/National Roadside Study (summer and fall of 1999) which provided data on commercial vehicles from a roadside survey at 238 sites across Canada. The completed dataset contained about 65,000 observations plus an additional 3,000 records from a supplemental survey in 2000.

To provide the required detail of cross-border travel, the P/N & F Study developed an integrated modeling framework built from four input streams:

- Regional Model – The primary demand analysis tool is the regional model. It provides network assignment capabilities for cross-border traffic between Ontario and Michigan. The regional model provides two levels of detail, with greater network detail for the Focused Analysis Area. The regional model also considers the impacts of tolling. In this model, trip tables combining peak hour local travel and cross-border passenger car and commercial vehicle travel are assigned to the regional model's highway network.
- Cross-Border Passenger Forecasting Process – This submodel estimates the total number of person trips crossing the Detroit and St. Clair Rivers, by trip purpose. Demand from this process is assigned to the transportation network.

- Cross-Border Goods Movement Forecasting Process – This submodel estimates rail and truck flows across the border. Trucks are then assigned to the network. The Consultant proposes to supplement this model with the commodity flow model from the DIFT study.
- Micro-Simulation Corridor Model – After analysis of the Regional Model results, detailed traffic simulations were developed for the travel corridors leading to and from border crossings in the Focused Analysis Area. The IBI Group used CORSIM.

Timing of Task: Month 2 to Month 20, inclusive and Month 27 to Month 32, inclusive.

Approach to Travel Demand Model

The Feasibility Study developed a 2030 traffic model (IBI TDM) based upon SEMCOG's 2025 Travel Demand Model, information from Windsor's modeling process, and MDOT's statewide model. The DRIC Consultant Team will refine and build on this model to develop the modeling tool for this study. This effort will be coordinated with that being conducted by the Ontario Ministry of Transportation by holding coordination meetings and using the Document Locator software to continuously exchange information. Document Locator is explained in Chapter 4.

TransCAD will be the modeling platform. While the Consultant will ensure that all model development is compatible with the version of TransCAD used by MDOT and SEMCOG, it is highly recommended that the model be adapted to use the latest version of TransCAD. TransCAD is developing rapidly, and new releases provide improved and more powerful modeling procedures that may produce a better tool for this study. A new version of TransCAD (4.8) is expected to be released in November 2004. The Consultant will develop a graphical user interface for the model that will simplify its application and the management of the alternatives analysis.

The base year TDM will be calibrated to replicate traffic (auto and truck flows) and other commodity flows across the Detroit River, and on major roadways in the US (principally in Wayne County). Particular attention will be paid to ensure accuracy in the sub-area, described next. It is expected that 2000 will be the preliminary modeling year, as it is the Census year and, consequently, the base year for other models because of data availability. After developing a preliminary model for 2000, it will be extended to a 2005 base year (the year when the DRIC Study begins).

The target year will be 2035 for which base socioeconomic data will be developed by extending input data from 2030 using straight-line extrapolation methods. The updated data will then be used to produce 2035 trip tables and estimates of autos, trucks and commodity flow for rail modes.

The specific steps to accomplish this objective are:

1. Obtain the complete IBI TransCAD model for the Feasibility Study.

2. Review the IBI model with the Steering Committee to ensure that it contains mechanisms for evaluating all alternatives and issues that will be encountered in the study. As a result of this review, the consultant will specify how the issues will be addressed, either by a change to the model or by an "off-model" solution.
3. Obtain the latest version of the SEMCOG, Michigan Statewide Model and Windsor Model. These are the models that IBI used to develop the original model for the Feasibility Study. If models have been updated, then update the data in the IBI model.
4. Review the USDOT Freight Analysis Framework (FAF) data to ensure that the mode is accurately replicating commodity model activities between the US and Canada.
5. The Consultant will work with the Steering Committee to determine if elements of its DIFT Commodity Flow Model (CFM) should be integrated into the updated model. If it is determined to do so, the Consultant will revise the CFM.
6. The RFP requests a midday peak hour model, as well as AM and PM peak hour models. The Feasibility Study model produced AM and PM peak assignments, but not midday. The Consultant will add the midday peak time period to the model.
7. The Consultant will validate the model to ensure it replicates current observed passenger car and truck flows. Validation tests will include:
   - Comparisons of passenger car VMT and truck VMT as indicated by traffic counts and as estimated by the model, for major geographic subdivisions, such as states, provinces, and for the detailed study area.
   - Comparisons of model volumes to counts (truck and car) at major screenlines and in major corridors.
   - Comparisons of model volume VMT to count VMT (truck and car) by type of roadway.
   - Statistical comparisons of model volumes and counts, such as percent root mean square error tabulations.
   - Conceptual plots showing these comparisons.

   The Consultant will adjust the model as required to reasonably replicate observed passenger car and truck volumes.
8. It will be important to develop and easy-to-apply model. Thus, the Consultant will develop a graphical user interface for the model. The Consultant will program the interface in TransCAD GISDK.

An elaboration of several key steps follows.

Definition of the Sub-Area

The Consultant will define a detailed sub-area for the international crossing as the zone adjacent to the Detroit River Area in which alternatives are located, and extending to I-94 and its connections to I-75 and I-96. The sub-area will include I-75 and I-96 north and west of I-94 for a sufficient distance to encompass the loading from the proposed border crossings and other major freight movements. Within the sub-area, the model will be refined and calibrated to the level of detailed needed to provide input into the micro- simulation traffic model. Thus, all model data will be disaggregated to the Census Block level within the sub-area.

As noted earlier, the starting point for the DRIC work will be the IBI Model that was developed in the P/N & F Study. The IBI model contains 1,499 traffic analysis zones (TAZs), including external zones. To allow more detailed modeling and use of data available in the Census,

the Consultant will refine the zone system by developing a hierarchical system of zones and geography. This system will incorporate all the important geography in the study area. While the exact definition of the system is yet to be determined, the preliminary approach is as follows:

- Country (U.S., Canada)
- States and Provinces – This is the level of detail of the DIFT commodity flow model outside Michigan.
- Counties – This is the level of the DIFT commodity flow model in Michigan.
- IBI Model TAZs
- SEMCOG TAZs (SEMCOG Region only)
- U.S. Census Blocks (U.S. only)

The TDM will incorporate the TAZ structure noted above. In the US, the basic building block for data will be U.S. Census Blocks. All larger areas will be combinations of these blocks. In the U.S., every block will carry attributes for the higher-level geography (SEMCOG TAZ, IBI Model TAZ, county and state). All geography and attributes (Census data, employment, etc.) will be maintained as TransCAD area databases. TransCAD has functions that allow the databases to be exported easily to ArcView and other formats, and provides an ideal format for easy exchange of data.

Level 1 Analysis

The TDM will be used to evaluate Illustrative Alternatives and the first level of analysis of Practical Alternatives. The model will produce traffic assignments for the average and three peak periods: AM peak, PM peak, and the midday peak. The Consultant will define these periods based on hourly traffic counts and the Origin-Destination (OD) trip tables for both trucks and passenger vehicles provided in the Feasibility Study. Following is list of the types of data that will be produced by the model (daily and by period) to support first-level screening of alternatives:

- Traffic volumes (stratified by autos, domestic trucks and international trucks);
- Volume-to-capacity ratios;
- Traffic densities; and,
- Expected travel speeds.

TransCAD will be used to illustrate travel paths through the network between key origins and destinations, as well as the expected travel times. The paths will be checked for reasonableness, and model adjustments will be made, as needed, to ensure that correct paths are being built. The Consultant will make field observations of travel times, and will consult with trucking interests on travel times and routes.

The Consultant will integrate portions of the DIFT Commodity Flow Model into the analysis, if that step is approved by the Working Group. It will identify key freight routes and freight movements in the network. Using this tool, freeway interchanges that are important to freight movements will be identified, and areas where capacity constraints may impinge on freight

mobility will be noted. Domestic and international freight movements will be identified (as noted earlier, domestic and international trucks will be modes in the model).

The TransCAD model will use a multi-modal equilibrium traffic assignment method. This procedure allows all traffic to be assigned simultaneously, while keeping track of the number of domestic trucks, international trucks and autos on every roadway link. It will also allow the use of passenger-car equivalents (PCEs), so that trucks are correctly accounted for when evaluating the consequences of congestion. As part of this process, through trucks will be restricted to certain routes, like interstates and freeways. A common convention is to assign long-distance trucks to truck routes on the basis of free-flow travel speeds, and to use an equilibrium capacity restraint for other vehicles (passenger cars and local trucks) that may divert to alternate, less congested routes in response to congestion.

For each alternative, the model will report for the base year (2005) and the forecast year (2035) passenger-car equivalents (PCEs) for 24-hour conditions (ADT) and three peak periods of the day: AM peak, PM peak, and a midday peak. As noted earlier, the model will report traffic stratified by autos, domestic trucks and international trucks. Volume-to-capacity ratios, traffic densities and expected travel speeds will also be produced.

The Consultant will prepare a report of major findings regarding the flow of traffic in the area, especially across the Detroit River. The analysis will identify significant changes in the capacity of rail freight facilities, or in the type of rail freight (e.g., cross-border double stack capability). Use of the commodity flow model will allow the impact on local intermodal operations to be directly assessed. Similarly, the model will allow the impact on international freight movements due to changes in intermodal facilities to be quantified. If it is decided that the commodity flow model should not be used, the Consultant will provide a qualitative assessment of the same activities.

Level 2 Analysis

For analysis of the Practical Alternatives, it is expected that the same modeling tools (the TransCAD-based model) will be used as in the Level 1 analysis. However, if it is found in the Level 1 analysis that the capabilities of the model need to be extended, or adjustments to the process made, changes will be accomplished prior to the Level 2 analysis.

The Consultant will conduct a detailed capacity analysis on the Level 2 Alternative. Volumes for this analysis will come from the traffic model. As noted earlier, the model will report volumes on each link in the network for auto, domestic trucks and international trucks. The volumes will be reported for the AM peak period, PM peak period, and midday peak period, as well as for a 24-hour period. In addition to traffic volumes, the model will report speeds, capacities, V/C ratios and traffic density. Data will be reported for the 2005 base year and 2035 target year.

The capacity analysis will be based on the latest version of the Highway Capacity Manual beginning at the border crossing plaza and extending on the U.S. side to the interstate system, and two interchanges north and two interchanges south. Additionally, it will include all freeway-freeway interchanges with significant freight flows (available from the model) and the I-94/I-96 interchange.

Level 3 Analysis

The DRIC will involve facilities of complex geometry and high traffic volumes. To analyze these conditions, microscopic simulation of a select group of Practical Alternatives is far superior to traditional traffic analysis using the TDM and the associated Highway Capacity Software (HCS). Therefore, VISSIM will be used to simulate traffic flow on freeways and surface streets. The main benefit of VISSIM over the HCS is that it analyzes the freeway system as a whole, rather than isolating each segment. This is especially important for complex urban freeway systems like Southeast Michigan's, where traffic backups due to poorly operating weaving segments, or tight merge/diverge areas, spill over and cause traffic congestion on other roadway segments.

To apply VISSIM, the Consultant will collect weaving volumes and origin-destination data to properly evaluate the existing operations where a new crossing would tie into the freeway system. Gathering these data will be done through a technique known as aerial surveying, in which a series of aerial photographs and aerial video are used to collect the following data:

- Origin-destination flows, by vehicle type. This is key to determining the amount of through traffic and weaving patterns. Unlike license plate surveys, there is no difficulty posed by commercial vehicles or out-of-state license plates so there is no inherent sampling bias.
- Travel times and speeds. An overall aerial view will also provide information on incidents and congestion "hot spots" that affect travel time, but are not obvious to "floating cars" traveling on the roadway system.
- Traffic densities, which equate to levels-of-service.

Manual turning movement counts and travel time studies will be conducted as appropriate to verify and supplement the aerial survey work. Additionally, traffic signal timing data for intersections included in the simulation will be collected from appropriate agencies including MDOT.

In addition, aerial surveying of traffic will describe problem areas at which the micro-simulation analysts will develop the base year model that properly replicates existing conditions.

VISSIM produces measures of effectiveness (MOEs) on a corridor or systemwide basis, rather than on a link-by link basis. The MOEs include total delay, stopped-time delay, stops, queue lengths, fuel emissions, and fuel consumption. VISSIM also produces very detailed results for any location within the model over any time interval defined by the user.

VISSIM produces several text files of MOEs that will be extracted into a spreadsheet in order to be assigned level-of-service ratings to delay values and compare other simulation results for multiple scenarios. The Consultant has developed its own in-house software that quickly reduces and reformats the output data so that it can easily be imported into a spreadsheet (Figure 1). MOEs will also be depicted visually in easily understood graphics (Figure 2 and 3).

Figure 1
Sample VISSIM Report

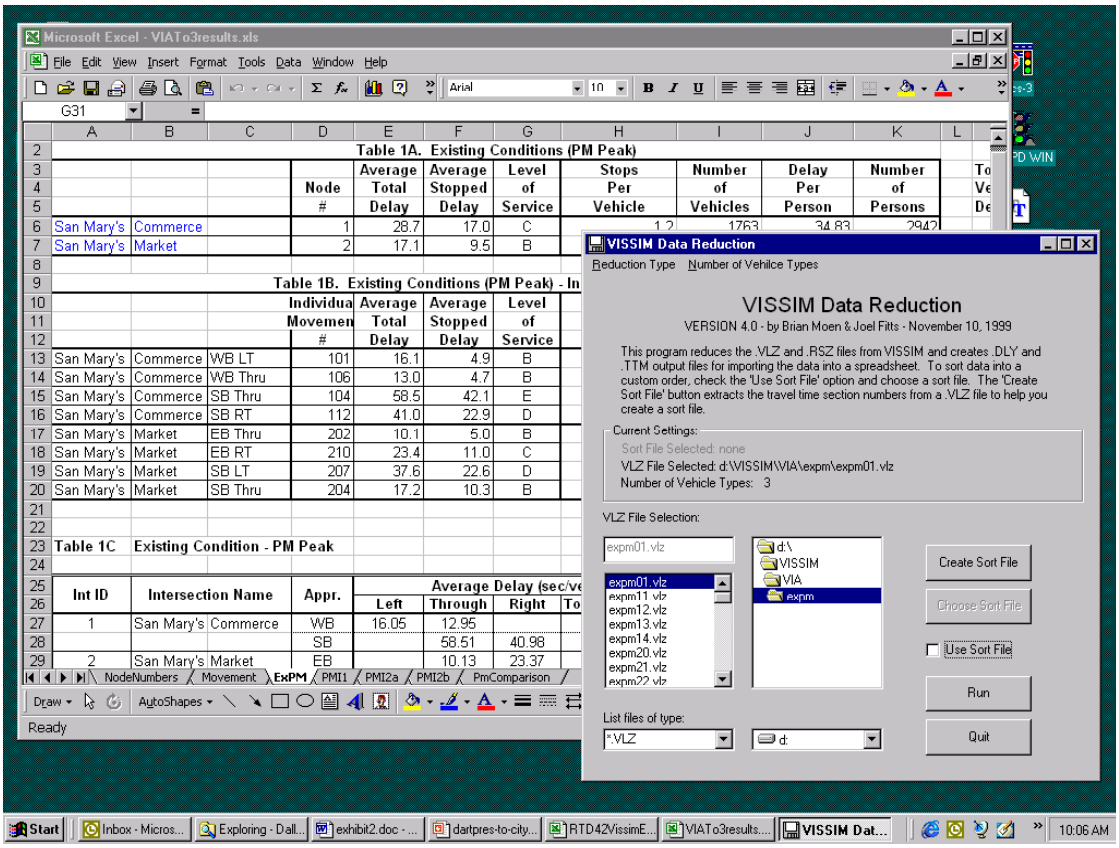


Figure 2
Online Review of Systemwide Performance
Level of Service (LOS)

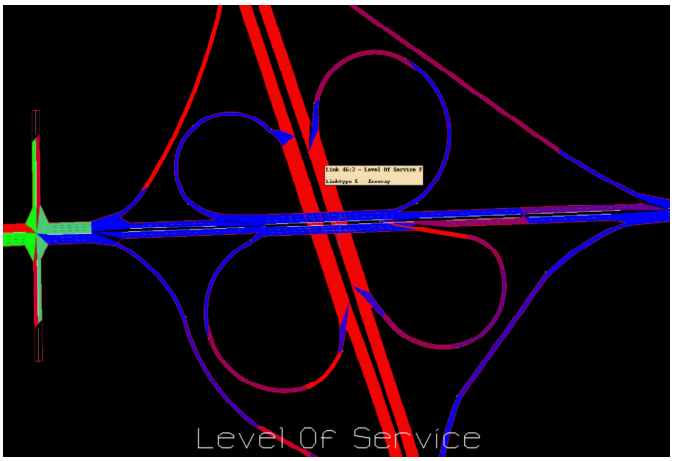
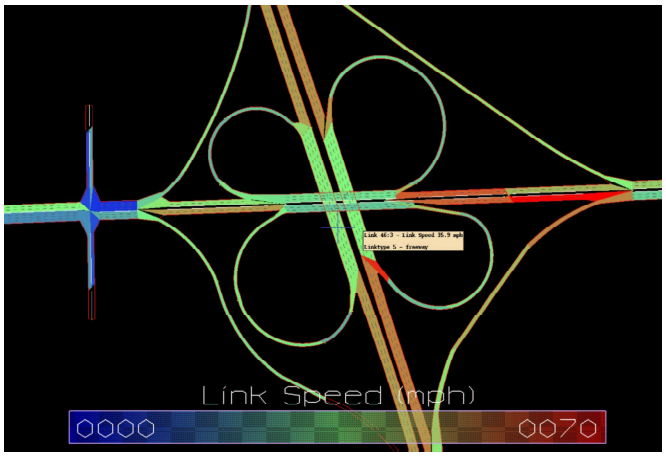


Figure 3
Online Review of Systemwide Performance
Link Speeds at 5:00 p.m.



Paramics will be used to model ITS and maintenance of traffic scenarios. Paramics code is available to simulate complex traffic operations such as ramp metering, incident and accident management systems, variable message signing and other Intelligent Transportation System applications that are extremely difficult to model in HCS or CORSIM. But, most importantly, Paramics is a route choice model and CORSIM is not. This means that in Paramics, the vehicles are allowed to choose the best path between their origin and destination, while in CORSIM they are pre-assigned to specific links. Therefore Paramics can answer questions such as "where will traffic divert if a ramp is closed?" If CORSIM were used, this answer could only come from the regional travel demand model, which has a much more macro assignment process than Paramics.

VISSIM and Paramics produce both 2-D and 3-D graphical animation files of simulation runs. Beyond the process of calibrating and ensuring the realism of the model, these animation files can be used to present the results of future conditions analyses (Figure 4), instead of "reading" a table of levels-of-service. Visualization demonstrates how each alternative operates and where traffic congestion is likely to occur. Visualization also makes it easier for the analyst to determine what is causing the traffic congestion and test alternatives to resolve the problem.

Figure 4
U.S. 36/Rockville Road Interchange Model using Paramics

Border Wizard

Access to and training in Border Wizard will be purchased from its developer, Royal Systems. Border Wizard will be used to analyze the inspection components of the border crossing plaza. It is a micro-simulation model developed to test federal inspection scenarios at land border stations to determine infrastructure, facility and operational needs for safe and secure border operations. The model simulates cross-border movements of autos, buses, trucks, and pedestrians. It simulates all federal inspection activities, including primary and secondary inspection, VACCIS inspection (i.e., rail car X-ray screening), and security procedures, as well as alert levels. It is intended to be linked to other traffic modeling and planning tools used by organizations such as SEMCOG.

The first step in the use of Border Wizard is data input. Facility and operational data are entered into the model. Sample facility data include layout of plaza, number of inspection booths, and secondary inspection parking spaces. Operational data include the kinds of equipment used, federal and contractor personnel conducting inspections, and processes in use by all border inspection agencies.

With this input, Border Wizard will graphically construct/modify border station design and operations by simulating the complex system interactions of cross-border movements and evaluating prospective and/or existing facilities. In the future, Border Wizard will allow users

to run studies on multiple border stations simultaneously and compare their effects on each other. This will be useful in analyzing proposed border station development and determining when an area will reach capacity.

Assumptions

To develop and apply the TDM, VISSIM and Border Wizard, as discussed above, it is assumed the Partnership Working Group will:

- Provide all files and documentation produced by IBI.
- Provide the latest MDOT statewide model.
- Facilitate access to the latest SEMCOG TransCAD model.
- Provide available traffic data in the study area, including:
  - ✓ Mainline traffic counts from PTRs.
  - ✓ Ramp volume counts.
  - ✓ Traffic signal timing data.
  - ✓ Classification studies.
  - ✓ Speed studies.
  - ✓ Turning movement counts.
  - ✓ Origin-destination studies.
  - ✓ Available data from the Michigan Intelligent Transportation System.

Deliverables

The Consultant will produce the following products in the Traffic Analysis task:

- A refined travel demand model (TDM), including the network assignments of two classes, domestic and international, of trucks and of passenger vehicles.
- A report thoroughly documenting the travel demand model development and calibration, including updated OD matrices.
- A report on freight mobility, discussing freight flows and issues on the TDM network for both domestic and international freight.
- Traffic Analysis Reports (TARs) to support decisions at each of the following stages:
  - Illustrative Alternatives: TDM measures of effectiveness and a narrative analysis to support evaluation of Illustrative Alternatives.
  - Practical Alternatives, Level 1 Travel Demand Analysis.
  - Practical Alternatives, Level 2 High Capacity Analysis
- Practical Alternatives Level 3 microsimulation, including an analysis of freight and passenger car mobility.
- VISSIM, Paramics, and Border Wizard simulations and traffic analysis for design of plaza and alternatives evaluation.
- DEIS, FEIS, Interstate Access Justification Reports prepared, as needed, at each stage of study.

Each product will be submitted to MDOT technical staff with sufficient lead time to allow for review/rework prior to transmitting the documents to the decision-makers.

P/PMS Task 2310 – Conduct Technical SEE Studies

Analysis of the social, economic and environmental effects of the alternatives is the scientific and technical underpinning of the environmental document. A number of separate reports will be produced toward this end. Supporting methodologies used in reaching conclusions will be provided. Comparative tables and matrices will be developed to summarize clearly the differences among alternatives. Mitigation measures will be discussed in appropriate detail for each Practical Alternative.

Following is a discussion of the approach to each of the NEPA analysis categories.

Threatened, Endangered, and Special Concern Species, Including Natural Communities

Objectives

There are 102 threatened (T), endangered (E), and special concern (SC) species of plants and animals that have or currently are known to exist in Wayne County. Of these species, 66 are plants, 32 are animals and 8 are listed as extirpated. In addition, 8 natural plant communities are known to occur within the county. But, many of these species are the result of occurrences recorded prior to 1950 or are associated with areas and habitats west of the study area. Therefore, given the nature of the study area (highly urbanized), T, E, or SC animal species have the highest likelihood of occurrence within the Detroit River, nearshore areas surrounding islands, and the Michigan shoreline, including known species on Belle Isle and Grosse Ile.

It is the purpose of this task to: 1) determine if the T, E or SC species, or their habitats, are present; 2) identify potential impacts to these species and their habitats; 3) comply with state and federal regulations; and, 4) identify alternatives to minimize and/or avoid impacts. The work plan identified below addresses these objectives in a sequence designed to provide reliable data while efficiently conducting field sampling. Detailed surveys are proposed only after Practical Alternatives are identified.

Timing of Task: Month 2 to Month 19, inclusive, and Month 27 to Month 29, inclusive.

Approach

Four steps are proposed as part of this task:

- Obtain Existing Resources Information (Illustrative Alternatives)
- Conduct Preliminary Field Surveys (Illustrative Alternatives)
- Conduct Detailed Field Surveys (Practical Alternatives)

- Analyze Data and Prepare Report.

Obtain Existing Resources of Information (Illustrative Alternatives)

Early coordination letters will be sent to state and federal agencies, after which meetings will be held to discuss the project, identify known T, E, and SC species, their preferred habitats, and known natural communities within or near the study area. Commitments will also be sought for continued coordination throughout the duration of the project as part of the Streamlining process.

Throughout this effort, the Consultant will obtain pertinent information from, but not limited to, the Michigan Natural Features Inventory (MNFI), Michigan Department of Natural Resources (MDNR) Wildlife Division, MDNR Fisheries Division, U.S. Geological Service (USGS), U. S. Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers (USCOE), Ontario Ministry of Natural Resources (OMNR), Wayne County, the City of Detroit, and Grosse Ile Township. The information obtained will include, but not be limited to the following:

- The county list identifying all threatened, endangered, and special concern plant and animal species and significant natural communities known to occur in Wayne County.
- The locations of known threatened, endangered, and special concern plant and animal species within the City of Detroit (specifically Belle Isle), Grosse Ile, and other islands located within the project study area.
- Lists of all threatened, endangered, and special concern plant and animal species and significant natural communities known to occur within and near the project area. This information will be provided by MNFI and MDNR Wildlife Division in response to specific requests by the Consultant.
- Maps identifying the known, suspected, restored, and historic locations of fish spawning beds, including those of state threatened Lake Sturgeon. This information will be provided by the MDNR, Fisheries Division and USGS in response to specific requests and meetings with the Consultant. Fisheries survey information will also be obtained from MDNR Fisheries Division, USGS, OMNR, and USFWS records identifying specific locations of collected threatened, endangered, and special concern fish species.
- Locations of the most recent collection sites for unionid species within the Detroit River (if available).
- Bathometric data of the Detroit River.

Also, as part of this task, the Consultant will utilize literature searches, and contacts with state agencies, federal agencies, universities, and other sources to characterize potential and preferred habitats of the plant and animal species identified through the research cited above. The habitats utilized by the species identified will be compared to known and potential habitats associated with the study area. All known and suspected areas with the potential to harbor threatened, endangered, special concern species and natural plant communities will be outlined on aerial photography.

Conduct Preliminary Field Surveys (Illustrative Alternatives)

The Consultant's biologists will conduct preliminary surveys of the study area to define potential habitats associated with the plant, animal, and natural communities identified above using aerial photographs and habitat descriptions. The location of all areas containing T, E, and SC species, natural communities, and/or habitats associated with these species/communities will be delineated on aerial photography.

Field surveys will be conducted at legal access points (including Belle Isle and Grosse Ile). Review of tributaries to the Detroit River will also be conducted by examining stream bank habitats and channel morphology. Surveys of the Detroit River and islands will be conducted by boat to characterize habitats associated with nearshore areas and adjacent plant community types.

Preliminary assessments of deeper water habitats associated with the Detroit River will be limited to initial boat surveys to document currents and the use of existing bathometric information to characterize habitats. Use of the areas by fish species will also be noted (e.g., sturgeon are active near the surface during spawning). All areas of known or reported T, E, and SC species and their habitats will be reviewed.

Conduct Detailed Field Surveys (Practical Alternatives)

For the Practical Alternative phase, the Consultant will conduct field surveys at a level of detail necessary to satisfy MDEQ, MDNR, and federal government requirements and to determine if any protected species and/or their habitats will be impacted by the project. These surveys will be conducted after Practical Alternatives have been developed and will be based on the potential methods of location and construction of the crossing. Because field identification for many T, E, and SC species requires time-specific surveys (spring, summer, and/or fall), this task will begin in late 2005. Optimum survey times for all species identified in Task 1 will be provided to MDOT with recommended schedules to determine compliance with project schedules.

Detailed surveys for fish, mussels, snails, and substrate types may be required. Decisions to conduct detailed aquatic surveys will depend on locations of identified Practical Alternatives, the likelihood of T, E, or SC species being present within the corridor of any of the alternatives, methods of proposed design, construction alternatives, and discussions and coordination with USFWF, MDNR, and MDEQ. Discussions with state and federal agencies will include identifying and gaining approval of all survey methodologies. They will be conducted as follows:

- Habitats will be characterized by identifying substrate types, depths, flows, structure, and vegetative beds. Sampling will be conducted using flow meters, underwater camera surveillance, PONAR or Eckman Dredges (where feasible), and, where appropriate, diving with SCUBA by certified and experienced divers.

- Aquatic assessments for the presence of mussels, snails, and some specific species will be conducted concurrent with the above, utilizing the same sampling techniques for habitats and the presence/absence of targeted species.
- Netting surveys for target fish species are anticipated within the corridors of the Practical Alternatives wherever methods and design of the border crossing suggest potential impacts to those species. The Consultant's fisheries biologists will conduct sampling using seines, trap nets, or trawls depending on location, depth, flow, accessibility, and target species sought.

Professional wetland scientists will conduct detailed plant community surveys within the study area. Vegetative assessments associated with shallow waters, undeveloped islands, Belle Isle and Grosse Ile will be conducted within the corridors of Practical Alternatives. Vegetative assessments will be conducted by:

- Meander surveys through all habitat types during the growing season, identifying all plant species encountered. If a plant is suspect, or of the same Genus as a T, E, or SC species, that specimen will be returned to the lab for further identification or sent to another botanist for confirmation.
- Identifying specific habitat types based on plant community types, hydrologic regimes, and if required, soil types to determine if habitat is present that could support any of the T, E, or SC species identified at the outset of this task.
- Mapping of each plant community type on an aerial photograph and developing comprehensive plant lists for each habitat type identified.
- Photographing each habitat type (where feasible).
- Using plots of one-, five-, and ten-meter circumference to identify herbaceous, sapling, and overstory vegetative layers, respectively.
- Performing a Floristic Quality Assessments (FQA) and its associated metrics, where applicable and feasible, given the level of information required to accurately assess the presence/absence of T, E, SC, and natural communities in the study area. Some of the FQA's metrics prove very helpful in understanding vegetative communities, past/present human disturbances to the site, and likelihood of harboring T, E, and/or SC species.

Analyze Data and Prepare Report

A report will be prepared which covers the methodologies used, graphic representation of the habitats found, descriptions of the habitats, a list of species identified in each habitat, FQA metrics, and the discussion of these results. The discussion and conclusions will reference the location of and/or the likelihood of T, E, SC species, and/or natural community features occurring within the study area.

The final report will address whether a T, E and/or SC species will likely be harmed by the proposed action. The report will address direct impacts (e.g. dredging, filling), indirect impacts (e.g. long tern sedimentation/water quality degradation), and cumulative impacts (e.g. future activities within the area as a result of the new crossing). Impacts assessments

will be based on documented habitat needs of specific T, E, and/or SC species, methods and designs proposed, the habitats and species identified, and perceived/anticipated impacts associated with alternative designs and construction methodologies. The report will also address/identify alternatives that could be implemented to minimize or avoid impacts to T, E, and SC species and potential alternatives to mitigate for unavoidable impacts.

Assumptions

The following assumptions are the basis of the approach discussed above:

- The majority of the project area consists of urban land and the primary focus of the assessments will be associated with the Detroit River and nearshore areas surrounding islands and the Michigan shoreline. The western limit of the project area is approximately I-94.
- Section 7 consultation with USFWS is not anticipated.

Deliverables

The product of this task, elaborated upon in the discussion presented above, can be summarized as: the T, E, SC, and Natural Community Technical Report, which will be summarized for inclusion in the DEIS/FEIS.

Coastal Zone Management Consistency

Objectives

Natural resource areas associated with the Great Lakes, and connecting waters, are present within the study area. It is the purpose of this task to identify these areas and potential impacts to ensure that the proposed project is consistent with the provision of the Coastal Zone Management (CZM) Act. Michigan has an approved Coastal Management Program and has determined that an activity on the coast will not likely be consistent with Michigan's approved CZM program, unless all required land/water interface permits can be issued for the proposed work. If the project is permitted by the MDEQ, then it is consistent with the CZM requirements. In addition, the CZM program has funded numerous shoreline access and development projects and any potential impacts resulting from these will be reviewed by CZM program staff.

The work plan below, in conjunction with work plans to address threatened/endangered species and wetlands, will allow determination of the project's impacts in a sequence designed to provide reliable data while optimizing the sampling efforts necessary.

Timing of Task: Month 2 to Month 19, inclusive, and Month 27 to Month 29, inclusive.

Approach

This task will be accomplished in four steps:

- Obtain Existing Resource Information (Illustrative Alternatives)
- Conduct Preliminary Surveys (Illustrative Alternatives)
- Conduct Detailed Field Surveys (Practical Alternatives)
- Analyze Data and Prepare Report

Obtain Existing Resource Information (Illustrative Alternatives)

Early coordination letters will be sent to state and federal agencies after which meetings will be conducted to discuss the project, CZM data and identify known CZM concerns. Commitments will also be sought for continued coordination throughout the duration of the project as part of the Streamlining process.

The Consultant will obtain pertinent information from, but not limited to, the Michigan Department of Environmental Quality's Great Lakes Shorelands Section CZM Coordinator, the U.S. Coast Guard and the U.S. Army Corps of Engineers (USCOE) Regulatory Branch regarding known or suspected concerns. If projects have been approved or constructed by a community using Federal CZM funds, coordination will also occur with those governmental entities. All CZM-related materials will be evaluated and concerns incorporated into the field work.

The information obtained will include, but not be limited to the following:

- A list of all CZM-funded projects in Wayne County.
- Lists of all natural resource species of concern known to occur within and near the project area. This information will be provided by MNFI and MDNR Wildlife Division and the US Fish and Wildlife Service in response to specific requests made by the Consultant for the study area.
- Maps identifying refuge areas, important feeding and wintering areas for migratory waterfowl and known historic locations of fish spawning beds. This information will be provided by the Department of Interior, USFWS, MDNR, Fisheries Division and USGS in response to specific requests by and meeting with the Consultant.

Conduct Preliminary Field Surveys (Illustrative Alternatives)

Biologists will conduct preliminary surveys of the project area to identify CZM work areas and potential CZM habitats of concern and associated natural resources identified through the work discussed above. These assessments will be conducted concurrent with wetlands and threatened and endangered species assessments.

Review of tributaries to the Detroit River will also be conducted at legal access points viewing stream bank habitats and channel morphology. Surveys of the Detroit River and islands will be conducted by boat by characterizing habitats associated with nearshore areas, if required.

Also, preliminary assessments of deeper water habitats associated with the Detroit River will be limited to initial boat surveys to document river currents and use of existing bathometric information to characterize habitats.

Conduct Detailed Field Surveys (Practical Alternatives)

The Consultant will conduct field surveys at a level of detail necessary to evaluate impacts to the coastal resources. Surveys will be site specific with methodologies dependent upon the coastal resource present and anticipated impacts to the resource, based on the Practical Alternatives developed.

Analyze Data and Prepare Report

Specific impacts to coastal zones will be analyzed based on potential methods of construction and location. Specific resources and impacts associated with surveys of wetlands, water quality, threatened and endangered species and coastal zone impacts will be highlighted but will be covered in detail in other technical reports. The findings in the CZM report will consider the indirect and cumulative effects for Practical Alternatives and be helpful in choosing a Recommended Alternative.

Assumptions

Two assumptions form the basis of this work:

- There will be no impact to critical dunes, sand mining or coastal barrier resources.
- The CZM impacts will likely be manageable under permit through MDEQ.

Deliverables

The product of this task, elaborated upon in the discussion presented above, can be summarized as the Coastal Zone Management Consistency Technical Report will be prepared. It will be summarized for inclusion in the DEIS/FEIS.

Archaeology Approach

The Consultant will examine background studies for the defined study area which encompasses a portion of the City of Detroit, and the cities of Ecorse, River Rouge, and Wyandotte, in Wayne County, Michigan. The study limits will extend from Belle Isle on the north, Grosse Isle to the south, the Canadian border on the Detroit River on east, and to I-94/I-75 toward the west. The Consultant will collect previously recorded archaeological information from the files maintained by the State Historic Preservation (SHPO)/Office of the State Archaeologist (OSA) and local records to identify known archaeological resources and possible Traditional Cultural Properties and Religious Properties and develop maps depicting their locations.

In addition to recorded sites, other data secured from historic maps will be used to demonstrate the spread of historic settlement over time, provide valuable evidence relative to shoreline fill episodes, and offer a likely indicator for Traditional Cultural Properties (TCP0 and Religious Properties through the documented locations of historic period village settlements. This information will be presented in the form of a constraints map, which will be reviewed and modified as necessary throughout the project. Each Illustrative Alternative will be divided into areas of high, medium, and low probability for the presence of archaeological resources. This information will be part of the basis upon which to develop the Illustrative Alternatives. For this effort, we are assuming that we will investigate up to six Illustrative Alternatives.

Once the Practical Alternatives are defined, the Consultant, in consultation with MDOT, will establish the APE for each. A document describing the APEs will be prepared and submitted to the SHPO for comment. The established APE for each Practical Alternative will become the study area for Land Use Histories. The Consultant will analyze the land use histories for refinement of archaeological and TCP site locations. The Consultant will support MDOT/FHWA in TCP meetings/consultation, including developing presentations, as required.

Phase I/II archaeological investigations will be conducted for the Practical Alternatives. Based on the results of the land use histories, the Consultant will excavate a number of backhoe trenches within the APE of each Practical Alternative. The trenches will be used to determine the presence of significant archaeological resources. If archaeological materials are located, the Consultant will conduct Phase II investigations to gather information sufficient to determine site significance and eligibility for listing on the National Register of Historic Places (NRHP). The trenches will be 3 m to 4 m (12 ft to 15 ft) long by about 1 m (3 ft) wide and excavated to undisturbed sub-soil. Standard archaeological field recording procedures will be used to document details of the archaeological resources, if discovered. For this effort, it is assumed there will be three (3) Practical Alternatives measuring one hundred (100) acres each. Assuming that a city block is 4.5 acres in size, it is estimated twenty-two (22) city blocks will be investigated per Practical Alternative and excavate forty (40) trenches per Practical Alternative or .4 trenches per acre or 1.8 trenches per city block. Phase I/II archaeological investigation will include all necessary analysis and report preparation. It is assumed that three archaeological sites will need Phase II evaluations, one (1) per Practical Alternative. All work will be completed according to the Work Specification for Archaeological – Cultural Resources Investigation that was included as Appendix G of the Request for Proposal.

Deep Site Testing

Geoarchaeology services related to the DRIC project will involve three components. First, the Consultant will focus on providing background information on geological deposits, environmental changes during the Holocene, regional stratigraphy, and depositional history of the project area. This information will aid in selecting three practical alternatives of around 100 acres each that will be investigated in greater detail for archaeological resources during Phase I and II work. Phase I/II archaeological investigations, which include deep testing for

buried sites and archaeological resources, will be conducted for all three of the Practical Alternatives.

Second, once the Practical Alternatives are selected, these three locations will be deep tested by the Consultant for buried historic and prehistoric archaeological deposits. This work will include complete subsurface testing using continuous, solid-earth coring and/or backhoe trenching testing methods as well as all necessary analysis and reporting. Finally, geological services will be provided by the Consultant during Phase II testing of archaeological sites within the three Practical Alternatives. It is estimated that three archaeological sites will need Phase II evaluations. These services will involve several site visits during excavation and will include such tasks as assessing the integrity of the archaeological deposits, evaluating site taphonomy, and developing a site depositional and developmental history, based on both the archaeological deposits that comprise the site and the soils and sediments that underlie and/or overlie it. The Consultant will also develop a detailed and internally consistent site stratigraphy, integrate the archaeological and natural stratigraphies, and provide advice regarding methods of soils and sediments analysis that may aid in understanding site formation, integrity, and/or function.

The largest portion of the geoarchaeological investigations will focus on deep testing the three 100-acre Practical Alternatives. It is assumed that, of the 100 acres within each of the Practical Alternatives, approximately ¾ (i.e., 75 acres) will lie within areas that may include significant Holocene deposition and require deep testing for prehistoric archaeological resources. It is assumed the other ¼ of the areas (i.e., 25 acres per locale) lie outside of areas of potential Holocene deposition. It is anticipated that approximately 20 trenches will be required to assess and map the subsurface within each of the three Practical Alternatives (i.e., 60 trenches total). To the extent possible, these will be completed concurrently with the archaeology testing to avoid duplicating efforts and to minimize disturbance. The investigations will focus on a systematic reconstruction of the geological and depositional history revealed by the stratigraphy of the flood plain and/or shoreline sediments. This will be accomplished by developing a three dimensional (3-d) model of the subsurface based on a series of backhoe trenches that penetrate important terraces and other fluvial features on the flood plain. The series of trenches will sample specific natural and/or cultural features, and be oriented to allow construction of a cross-section, or series of cross-sections, that shows the stratigraphic and lithological relationships and correlations of each geologic, pedologic, and archaeological unit revealed in the trenches. These cross-sections are also intended to link the stratigraphy discovered in the trenches to the human and natural landform surface features on the flood plain. Periods when prehistoric people could have lived on or near the shoreline of the segment of the Detroit River under study can be established by developing a complete picture of the depositional history, stratigraphic locations and times of depositional hiatus.

The deep testing field methods applied to the Practical alternatives will focus on detailed observations from a series of backhoe trenches. The trenches will be 3 m to 4 m (12 ft to 15 ft) long by about 1 m (3 ft) wide. The depth of each trench will depend on local conditions as well as the physical limits of the backhoe arm (about 3 m to 5 m [12 ft to 16 ft]). Excavation will continue until the physical backhoe limit is achieved, pre-Holocene sediments (i.e., late

glacial sediment or bedrock) are penetrated, or ground water fills the trench. At the discretion and determination of the geoarchaeologist in the field, buried surface soil horizons or other soil horizons and stratum that may include archaeological materials and debris will be closely inspected for the presence of cultural material. Additionally, if necessary, sediment or soil samples of suspect horizons will be screened through a ¼ inch mesh screen.

Standard field recording procedures will be used to document details of the pedological and geological environments of formations for sediments observed within the trenches. Additionally, details concerning historic fill and debris will also be recorded and the thickness and depth of the historic fill deposits and disturbances will be mapped. The depositional observations of soils and sediments will include descriptions of color, texture, and lithology of each lithological unit, as well as observations of depositional characteristics such as bedding, sorting, and contacts between units. Bed contacts for both prehistoric and historic deposits will be mapped and altitudinal differences recorded. Importantly, temporal indices will be provided ^{14}C age estimates of organic materials, and/or by any cultural artifacts recovered from specific units within the trenches. Post-depositional weathering and soil formation will be recorded following standard soil descriptive terminology United States Department of Agriculture, Soil Conservation Service (USDA-SCS 1974). These include descriptions of color, mottling, structure, consistency, inclusions (chemical and artifactual), intrusions (roots and pores), and transferrals (cutans and in-filled pores). Once the excavation for each trench is completed, it will also be photographed. The position of deep test trenches will be mapped in relationship to other features and trenches at the site and their geographic position recorded using a modern GPS receiver (i.e., differential and/or WAAS correction to provide at least 3 m to 5 m [12 ft to 15 ft] accuracy). All organic-rich zones will be bulk sampled as potential ^{14}C specimens and, if necessary, several representative sediment profiles will also be taken.

Assumptions

All work will be performed by Consultant personnel who meet the requirements specified in the Secretary of the Interior's Guidelines. It is understood that all Tribal consultant (if required) will be conducted by MDOT/FHWA with the Consultant providing support, as needed. It is assumed that no Phase III archaeological data recoveries will be conducted as part of this project. All work tasks will be coordinated with the MDOT Staff Archaeologist and Project Manager.

Deliverables

The Consultant will provide MDOT with detailed land use histories of the identified Practical Alternatives coupled with archaeological and TCP location maps. The Consultant will further complete Phase I/II archaeological survey/evaluations, including the preparation of a technical report for agency review, for the three recommended Practical Alternatives. These investigations will include geomorphologic and deep testing. If necessary, investigations will be completed for the identification of submerged archaeological resources. These reports will be summarized and revised for public consumption and distribution. The Consultant will provide DEIS, FEIS, ROD archaeological resources sections and contribute to MOA

development. The Consultant will further be available for public and project meetings and contribute to the development of support materials and exhibits.

Architecture – Above Ground

Objectives

The Consultant will identify and evaluate the effects of project development of the proposed Detroit River International Crossing (DRIC) upon area aboveground resources along guidelines that fulfill the requirements of Section 106 of the National Historic Preservation Act (NHPA), and Section 4(f) of the U.S. Department of Transportation Act (49 U.S.C. 303). These studies will be carried out according to the standards outlined in MDOT work specifications for the survey and evaluation of aboveground cultural resources. The Consultant will serve to identify a logical, reasonable Area of Potential Effect (APE) for the study areas, identify and evaluate all historical aboveground resources within the APE, determine potential impacts to the identified resources associated with each Illustrative and Practical Alternative, and to assist in defining Recommended Alternatives that will avoid adverse impacts, minimize impacts or provide mitigation where adverse impacts are unavoidable.

Architecture Approach

The Consultant will examine background for the defined study area which encompasses portions of the City of Detroit, and the cities of Ecorse, River Rouge, and Wyandotte, in Wayne County, Michigan. The study limits will extend from Belle Isle on the north, Grosse Isle to the south, the Canadian border in the Detroit River on the east, and I-94/I-75 towards the west. The Consultant will collect previously recorded above-ground site location information from the files maintained by the State Historic Preservation Office (SHPO). This will include reviewing existing documentation that provides historical backgrounds/contexts for the project area.

Aboveground evidence will initially include previously recorded site locations either listed, or determined eligible for listing on the National Register of Historic Places (NRHP). These data will be supplemented by data drawn from published map sources spanning the eighteenth through mid-twentieth century that can contribute to the better understanding of riverfront development and the overall spread of urban growth throughout the study area as it occurred over time. This will include State historic districts and individual resources (including buildings, structures and sites). This information will be provided in the form of a constraint map that will be used for the development of the Illustrative Alternatives.

For the selective Illustrative Alternatives, the Consultant will further develop the constraint map using public input and windshield surveys. It is assumed up to six Illustrative Alternatives will be studied. Once the Practical Alternatives are identified, the Consultant, in cooperation with MDOT, will establish the APE for each Practical Alternative and seek

comment from the SHPO. The Consultant will seek to identify stakeholders/interested parties (persons knowledgeable about resources) for each of the Practical Alternatives.

The Consultant will plan and conduct reconnaissance and surveys for the Practical Alternatives. For this effort, three Practical Alternatives are assumed, each measuring one hundred (100) acres. For the reconnaissance level survey, up to 675 structures will be recorded, or an average of 225 per Practical Alternative. For the intensive level survey, up to 75 structures will be recorded, or an average of 25 per Practical Alternative. These will be documented according to the Work Specifications for Survey of Aboveground Cultural Resources included as Appendix H of the Request for Proposal.

Assumptions

All work will be performed by qualified Consultant personnel. The Consultant will participate, as requested, with MDOT and the Federal Highway Administration (FHWA) in regular team meetings, public meetings, and hearings as well as consultation with stakeholders relative to aboveground resources.

All contacts made with agencies and stakeholders will occur under the direction of the MDOT Project Manager. The MDOT Historian and the Project Manager will be copied with all written communications either by standard or electronic mail. The Consultant recognizes that the urban setting of the study location places historic properties in the position of primary concern.

Deliverables

The Consultant will submit draft and final aboveground cultural resource technical reports for the project. These will include maps depicting the APE and known and potentially historic aboveground resources. The Consultant will generate presentation quality maps, photographs and supporting graphics demonstrating the general historical and contemporary contexts of individual districts and/or resources for use in public meetings, newsletters, Web sites, outreach and cultural reports. The Consultant will, if needed, prepare draft and final MOAs, and furnish appropriate sections for the DEIS and FEIS.

Agriculture

Objectives

This effort will ensure that the EIS is in compliance with all federal and state laws regarding agricultural property impacts, notably land enrolled in conservation programs under Michigan Public Act 116 (The Farmland and Open Space Preservation Act), or prime and unique farmland covered by the Federal Farmland Protection Policy Act. Analysis will extend to farmland that may be used for wetland mitigation. In some instances, wetland mitigation may occur on property used for agricultural purposes, especially what is commonly referred to as “prior converted” farmland.

Timing of Task: Month 2 to Month 7, inclusive.

Approach

For the Illustrative Alternatives analysis, aerial photography will be examined and windshield surveys performed to determine the location of the agricultural land. This information will be provided to Quantm for analysis, as discussed in Task 2140. The quantity of this land possibly affected by an alternative will be an output of the model.

The right-of-way needs of the Practical Alternatives will be overlaid on aerial photography showing the farmed or forested areas. All areas zoned for agricultural or forestry use will be reviewed for impacts. If farmland or forested areas are identified, it will be necessary to submit form AD-1006 (The Farmland Conversion Impact Rating Form) to the Natural Resource Conservation Service (NRCS). When the NRCS returns the AD-1106 form, the Consultant will complete Part IV (Site Assessment Criteria).

The Michigan Department of Agriculture maintains a database listing all Act 116 Land. It will be searched to determine whether any land with potential for acquisition or in close proximity to any alignment is listed in the database.

Using information from the database and the completed AD-1006 forms, the Consultant will define impacts to farmland under the state and federal laws. This will include adverse effects to well-maintained farm investments, such as barns, irrigation systems, orchards, and vineyards. The effects on farm income and the social implications of land acquisition will be reviewed.

If wetland mitigation calls for use of farmland, the same review process will apply.

The analysis of indirect and cumulative effects for the Practical Alternatives will also be included in the analysis of impact to farmland.

Assumptions

It is anticipated that the farmland will play a minor role in the study of the corridors identified thus far in the United States because they are in highly-developed areas. Nevertheless, this category will be given proper consideration in the SEE Studies.

Deliverables

The DEIS/FEIS will cover the results of the agricultural lands analysis. Completed farmland conversion impact rating forms (AD-1006) will be included as an Appendix to the EIS, as appropriate. Likewise, EIS documentation will reflect coordination with the Michigan Department of Agriculture (scoping).

Noise

Objectives

The Federal Highway Administration has developed a *Highway Traffic Noise Analysis and Abatement Policy and Guidelines* (June 1995) and the Michigan State Transportation Commission has developed *Policy on Noise Abatement* (Guideline 10136, July 31, 2003). The Michigan Department of Transportation has subsequently developed procedures for implementing this policy. The purpose of this task is to conduct an analysis which fully meets the requirements of these regulations/guidelines. The Consultant is very familiar with them through performing numerous noise studies, including most recently those related to the DIFT project and the lane addition to I-75 in Oakland County. The latter study resulted in the potential for over four miles of noise barriers along one or the other side of that 18-mile corridor.

Timing of Task: Month 2 to Month 10, inclusive; Month 14 to Month 19, inclusive; and, Month 27 to Month 29, inclusive.

Approach

For purposes of evaluating Illustrative Alternatives, a determination will be made of the number of homes that could have front-line exposure to various road alignments within specific corridors. This offers a measure of comparing alternatives and the numbers of people who might be exposed to unwanted noise from those alternatives. These data will be compiled through use of Quantm and review of recent aerial photography.

When the Practical Alternatives are determined, the Traffic Noise Model (TNM2.5) will be used to predict noise levels during the year of opening and the design year of the proposed facility. Those noise predictions will be based on “loudest hour” conditions. Given the project’s large amount of heavy truck traffic, it is possible that the loudest hour could be a period other than the usual morning and afternoon peak hour of total traffic activity, as trucks tend to move in large volumes during the nighttime. Twenty-four hour historic traffic counts will be examined to determine the pattern of truck traffic with respect to auto traffic and the hour will be determined that expresses the loudest combination of those vehicle types. Medium trucks, RVs, buses and motorcycles will be covered in the analysis.

The analysis will begin by identifying potential sensitive receptors and taking representative field measurements of noise at those locations. Noise levels are highly variable from place to place and it will be important to take the measurements that are representative of multiple sensitive receptors under the anticipated local conditions with the project in place.

The measurements of existing noise will be particularly important around the alternative plaza areas. Whereas noise from a line source, such as a road, is relatively easy to model, noise from an area where vehicles are moving around in a variety of directions at various speeds is not as easy to model. Real-world experience/actual measurements will be valuable to authenticate the modeling of future plaza areas. This is especially so because the TNM2.5 is

not designed to account for gearshifts and braking of trucks, which account for a portion of the noise under idle and slow movement conditions.

It is likely that some portions of plaza areas and custom facilities will warrant noise walls. However, the function of these walls tends to be blurred with respect to their additional role for security and aesthetics. So, there will be walls in some cases for noise purposes, in other cases for security or aesthetic purposes, and in other cases for a mix of these purposes. Those areas for meeting noise abatement criteria will be identified separately and called out as noise walls, per se.

Assumptions

Noise walls will be identified where noise criteria are exceeded and the walls are determined to be reasonable and feasible. MDOT bases the cost of noise walls on two units, a linear foot cost and a square foot cost. The linear foot cost expresses the cost of foundation development and drainage. The square foot cost covers the upper portion of the wall after the base has been prepared. These unit costs change over time. It is assumed the latest data will be provided by MDOT. Similarly, it is expected MDOT will provide for the reasonability test the current allowable cost-per-dwelling-unit. The intent of the reasonability test is to determine which potential walls are cost-effective. If there are too few receivers, or a wall is too short, walls sometimes are not deemed “reasonable.” Feasibility relates to whether a wall can be properly engineered. There is a limit to how high walls can be built, especially on structures (bridges), due to the load the wall may place on the structure, or the need to protect against high winds. So, in plaza areas, if there are elevated sections, it will be important to understand the engineering feasibility based on wind loads as they may limit the height of walls at certain key locations.

Deliverables

A Noise Study Report will be prepared as a standalone document for this project. It will be summarized for the noise section of the DEIS and FEIS.

Air Quality

Objectives

A committee was established during the Planning/Need and Feasibility Study to determine the methodologies to be used to address air quality impacts of the project. This was particularly important because heavy-duty diesel trucks comprise a substantial portion of the traffic moving across the border, and, historically, there have been long lines of trucks queuing very visibly on local streets, while awaiting movement through customs. These idling trucks have focused attention on both border crossing needs and the air pollution emitted by these trucks. There is also concern on the Canadian side of the border with respect to greenhouse gases and cross-border migration of air pollutants. So, one objective of this task is to address the issues outlined in the Air Quality Protocol that emerged from the activity of that committee. The DRIC Study analysis will extend that program to reflect more recent developments in analysis, such as those related to Mobile Source Air Toxics (MSATs) and

the anticipated status of the Southeast Michigan region as non-attainment for the $PM_{2.5}$ Standard. The air quality analysis will conform to procedures outlined in 40 CFR 51 and 23 CFR 771, the Clean Air Act, as amended, and the National Environmental Policy Act. It will also be sensitive to the procedures used in Canada and the kinds of information that will be developed for the parallel environmental assessment being prepared there.

Timing of Task: Month 2 to Month 10, inclusive; Month 15 to Month 19, inclusive; and, Month 27 to Month 29, inclusive.

Approach

The air quality analysis will first address the current attainment status of Southeast Michigan with respect to National Ambient Air Quality Standards (NAAQS). Baseline data from existing monitoring stations proximate to each of the potential corridors will be plotted to graphically depict trends in local air pollution and how data at each monitoring station relate to the NAAQS. These graphs will assist in understanding the relationship of pollutants to the standards on a localized basis.

The analysis will then focus on broader pollution trends and US EPA measures to improve air quality. These include regulations that: 1) reduce the amount benzene and other volatile chemicals in gasoline and of sulfur in diesel fuel; 2) expand regulations to improve the emissions from diesel engines; and, 3) extend regulatory control to off-road vehicles. Taken together, these measures are anticipated to substantially reduce some of the more troublesome pollutants within the timeframe of a new border crossing's construction.

These measures are especially important in light of Southeast Michigan's designation as of April 15, 2004 as non-attainment for the eight-hour ozone standard. The SEMCOG region was fortunate in successfully arguing that the eight-hour ozone designation be reduced from moderate to marginal, but a conformity analysis is still necessary. Nevertheless, designation as non-attainment for fine particulate matter ($PM_{2.5}$) is anticipated by the end of 2004.

At the Illustrative Alternatives analysis phase, the degree of exposure of populations to substantial volumes of cars and trucks will be measured. Ways of measuring this were discussed in developing the Air Quality Protocol in the P/N & F Study. The goal was to establish a measure that relates numbers of persons proximate to numbers of vehicles, but a method has yet to be defined. One element of the evolving protocol for the International Border Crossing EIS will be to establish such a measure. The intent is to identify "sensitive receptors", interpreting that phrase to mean concentrations of residential populations.

At a regional level, it is generally agreed that minimizing vehicle miles and hours of travel is good for air quality. The alternative(s) that performs best for transportation purposes by minimizing travel time also generally produces the least amount of air pollution. Therefore, from a regional perspective, at the Illustrative Alternatives stage of analysis, vehicle miles and hours of travel will serve as surrogates for pollution. Alternatively, the pollutant burden of each alternative can be calculated (see discussion below).

At the Practical Alternatives analysis stage, the above steps will be repeated but at a more refined level. At the local level, the normal requirement is use of the CAL3QHC model to determine concentrations of carbon monoxide (CO) at "hotspots" to assess whether an individual in close proximity to busy intersections might be subject to more CO than allowed by standards. Over time, violations of CO standards have substantially diminished. With ever-improving engines, CO violations from vehicular traffic are rare. Still, plaza areas, where substantial numbers of vehicles idle for extended periods of time, are a particular concern.

The traffic analysis work calls for forecasting travel demand to 2035. The regional analysis, noted above, relies on the travel demand model to produce systemwide vehicle miles of travel and vehicle hours of travel. The Consultant has just completed for the DIFT Study a detailed air pollutant analysis linking travel model output to per-mile emission factors to generate the "pollutant burden" for selected roadway links in sensitive areas. In the DRIC case, the system will be a number of the key roadways covered by the trans-national travel model. Emission factors will be calculated using a variety of approved inputs and EPA's latest version of MOBILE6.2. Output will be produced in burden, i.e., grams per mile, by pollutant, for defined vehicle types and speeds by link in the system. This includes Mobile Source Air Toxics, which FHWA and EPA agreed in June 2004, would be produced and reported upon.

Burden in this case means the mass of a pollutant per time unit, such as a day. Burdens for all analysis roadway links when added together produce a systemwide total.

The study area systemwide pollutant totals generated in this process are useful for evaluating alternatives, but are not sufficient for the conformity analysis, which must be done for the appropriate years on the FHWA-approved SEMCOG model. This involves use of the seven-county regional highway network that has been approved for air quality conformity determination, plus the new link(s) to the border crossing. SEMCOG will likely draw from the DRIC modeling effort the forecast traffic volumes for the Ambassador Bridge, the Detroit-Windsor Tunnel, and a new border crossing(s).

The conformity analysis will be performed by SEMCOG when a Recommended Alternative is selected. The improvements associated with that alternative will become part of the SEMCOG long-range plan and be run to assess conformity with that plan. For the ozone conformity, there will be an analysis of ozone precursors: volatile organic compounds (VOCs) and nitrogen oxides (NOx). Conformity analysis for CO will also be performed to demonstrate continued maintenance of the CO standards.

EPA has not yet defined the conformity process associated with the new PM2.5 standard. But, it is understood that a hotspot analysis will be required. In Canada, the CAL3QHC model has been used for dispersion (i.e., hotspot analysis) of $PM_{2.5}$. Under the Feasibility Study Air Quality Protocol, use of CAL3QHC was not agreed to. So, while it is known that hotspot analysis will be required, the analysis process will have to be defined by updating the AQ Protocol established during the P/N & F Study. The Consultant will accomplish that task early in the study process.

Assumptions

It is assumed that the course of the DRIC air quality analysis will be consistent with the P/N & F Air Quality Protocol, updated on the basis of FHWA/EPA agreements reached through the DIFT Study on handling of mobile source air toxics. The new nonattainment status of the region with respect to $PM_{2.5}$ also makes it logical to assume that FHWA/EPA will provide guidance on any newly-required, $PM_{2.5}$ hotspot analysis.

Deliverables

An Air Quality Technical Report will be developed. Its contents will be summarized for inclusion in the appropriate sections of DEIS and FEIS.

The Consultant will have a role developing input to SEMCOG's conformity test by identifying, for the appropriate years, the traffic volumes at the new border and existing border crossings. SEMCOG's model does have external stations at the Detroit River for the tunnel downtown and the Ambassador Bridge. The modeling involved in the DRIC Project will lead to new forecasts at these two locations as well as the anticipated traffic at the new border crossing.

The Air Quality Report will identify potential mitigation. A very real concern is concentrations of pollution downwind from plaza areas, particularly those locations where trucks may idle for some length of time while waiting to depart the customs area. The appropriate federal agencies will be consulted to determine whether engine shut-off policies can be instituted at the plazas. The analysis techniques used within plaza areas will provide information on delay/idling by trucks and autos which can be translated into pollutant burden. This would provide insight to localized impacts and possible mitigation, even if dispersion of that pollutant burden were not performed.

Flooding

Objectives

An analysis of flood conditions is necessary to ensure that the proposed alternatives avoid increases in flooding potential while preserving the existing floodplain and floodway. An analysis of flood conditions is also critical to ensure the proposed alternatives are in compliance with all state and federal laws regarding floodplain, coastal zone, coastal barrier, and works in the Detroit River.

The Consultant will conduct the floodplain analysis in conjunction with hydraulic/hydrologic and water quality analyses, thereby integrating hydraulics-related disciplinary design while minimizing duplication of work.

Timing of Task: Month 2 to Month 9, inclusive; Month 16 to Month 19, inclusive; and, Month 27 to Month 29, inclusive.

Approach

This task will be accomplished in three steps:

- Obtain Existing Resource Information (Illustrative Alternatives)
- Prepare Preliminary Mapping (Illustrative Alternatives)
- Prepare Mitigation Plan (Practical Alternatives)

Obtain Existing Resource Information (Illustrative Alternatives)

The floodplain data gathering will be part of the Hydraulic/Hydrology/Water Quality analyses research. Specific information pertinent to floodplains will be gathered, including:

- Contour information
  - Mapping for coastal zone
  - As-built plans of flood control facilities located along the Detroit River and other existing floodplains
  - The latest FEMA Flood Insurance Rate Map (FIRM)
  - The latest FEMA Flood Insurance Study Reports and numerical models
- USCOE hydraulic model for the Detroit River.
- Floodplain mitigation and wetland mapping information from state, federal, and local agencies.
- Ground elevations on properties located within or adjacent to the floodplain within the study area.
- Measured water levels and corresponding discharges
- Rules, regulation, and permit requirements related to works in the floodplain

After reviewing existing data, professional hydraulic/hydrologic engineers will conduct a field investigation to define the approximate limits of the floodplain, flood control facilities, and topographic features within the study areas. The condition of the existing floodplain including photographs, high water marks, and signs of flooding will be documented.

Prepare Preliminary Mapping (Illustrative Alternatives)

The existing hydrologic and hydraulic models obtained from the agencies will be calibrated for the project vertical elevation datum. A baseline map showing the existing floodplain, floodway, flood elevations, and ground elevations of properties will be prepared for impact assessment. Historic flood or extreme precipitation data will also be modeled to identify flood-susceptible areas.

Preliminary floodplain impact assessments of each alternative will be made by superimposing the conceptual construction limits over the existing floodplain limits/flood control features/constraints shown on the baseline map.

Maps and impact assessments will be used to define constraints and regulatory requirements for the development/evaluation of the Illustrative Alternatives.

Prepare Mitigation Plan (Practical Alternatives)

The results will then be distributed among the various discipline teams for roadway and bridge geometric adjustments. This iterative process will continue until there are no adverse effects of the proposed alternative on existing floodplains according to floodplain regulations.

Assumptions

The following is assumed in conducting this task:

- A floodplain model exists.
- Land elevation contour in floodplain exists.

Deliverables

Results of the flood conditions analysis will be incorporated in the project Hydraulic Report. It will include discussions and recommendations regarding impacts to the existing floodplain and flood control facilities. The report will also identify regulatory requirements associated with impacts and mitigation to the Detroit River and other existing floodplains. Additionally, the report will include:

- Baseline mapping showing the existing floodplain limits, floodway, and 100-year flood elevations;
- Proposed alternatives, projected floodplain limits, and 100-year flood elevations superimposed over the baseline map;
- Area of each wetland impacted by illustrative, practical, and recommended alternatives;
- Floodplain regulations and agency requirements;
- Mitigation requirements; and,
- Discussions and recommendations.

Water Quality

Objectives

The water quality impact analysis will concentrate on two areas: surface water and groundwater. The surface water evaluation will identify and document water quality issues to produce designs that are in compliance with the goals of the Clean Water Act, as amended (Public Law 92-500). The groundwater evaluation, in coordination with the Environmental Protection Agency (EPA) and other regulatory agencies, will be carried out consistent with the Safe Drinking Water Act, as amended (Public Law 93-523). This Act requires groundwater quality to be maintained in a manner that is reasonably expected to protect human health and the environment.

Timing of Task: Month 2 to Month 10, inclusive; Month 14 to Month 19; and, Month 27 to Month 29, inclusive.

Approach

This task has three steps:

- Obtain Existing Resource Information (Illustrative Alternatives)
- Conduct Preliminary Field Surveys (Illustrative Alternatives)
- Assess Impacts (Illustrative and Practical Alternatives)

Each step is described below. It is noteworthy this work will be conducted concurrent with the wetlands, coastal zone management and threatened/endangered species tasks.

Obtain Existing Resource Information (Illustrative Alternatives)

The Consultant will obtain information from, but not limited to, the Michigan Department of Natural Resources (MDNR), Southeast Michigan Council of Governments (SEMCOG), U. S. Fish and Wildlife Service (USFWS), Wayne County Department of the Environment, the U.S. Army Corps of Engineers (USCOE), the Michigan Department of Environmental Quality (MDEQ) Land and Water Management Division (LWMD), MDEQ Water Bureau (WB), MDEQ Remediation and Redevelopment Division (RRD), MDEQ Office of the Great Lakes (OGL), MDEQ Waste and Hazardous Materials Division (WHMD), the United States Department of Agriculture (USDA), Wayne County, the City of Detroit, and Grosse Ile Township. The information gathered will be compiled and placed on aerial photos for use during field assessments. The information obtained will include, but not be limited to the following:

- USGS topographic maps and digital aerial photographs.
- All legally designated drains and natural watercourses as identified by Wayne County Department of Environment.
- The National Wetlands Inventory Map.
- Michigan Resource Inventory System overlays.
- USDA soils maps for Wayne County.
- Total Maximum Daily Load (TMDL) for listed pollutants for all water bodies within the study area.
- TMDL determination and testing criteria.
- Water quality standards.
- Grosse Ile's wetland inventory maps.
- NPDES Permit requirements.
- Phase II stormwater regulations and requirements.
- Required testing procedures and protocol to determine presence/absence of contaminated sediments.
- Other mapping and compliance information from state, federal, and local agencies.

Conduct Preliminary Field Surveys (Illustrative Alternatives)

Based on the mapping, all surface waters that are regulated by state and federal agencies will be identified and those regulated under specific statutes will be highlighted. All surface

waters encountered will be located on aerial photographs and created as an overlay using ArcView software.

Based on research and preliminary field review, the following will be provided as input to developing and evaluating the Illustrative Alternatives:

- Maps that identify surface water bodies as defined in (Part 31, Part 301, Part 325, and Part 303 of NREPA which are within the project study area.
- A list and maps that identify all water bodies with TMDL's and associated mixing zones within the study area.
- Description of TMDL Goals and TMDL non attainment issues for each water body/watercourse (if required).
- A description of MDEQ's water quality standards.
- A description of MDOT's Phase II stormwater permit and requirements as they may relate to potential alternatives.
- Required Detroit River sediment testing as related to dredging or sediment disturbance associated with proposed alternatives.
- A description of NPDES permit requirements as they may relate to this project.

Assess Impacts (Illustrative and Practical Alternatives)

The following assessments will be undertaken:

- Impacts based on regulatory requirements and information relating to discharges and pollutants expected for each alternative.
- Impacts expected to water quality and associate flora and fauna based on information on impervious surface calculations, estimated pollutant loading, adjacent contaminated sites and leachate, stormwater discharge, and hydraulic reports.
- Impacts expected through alternative construction procedures associated with any required river sediment disturbances, measures for protection of downstream waters from release/disturbance of contaminated sediments, and disposal requirements for contaminated sediments (if required).
- Mitigation procedures to assure compliance with MDEQ-Water Division goals and/or TMDLs (if required).

Assumptions

It is assumed that groundwater along the Detroit River is generally contaminated because of nearby industrial uses but the contamination is likely limited to the surficial perched groundwater. The natural clay strata have proven to be effective barriers to downward migration of contaminants.

Deliverables

The work of this task will produce:

- A detailed inventory and mapping of surface water and groundwater areas of impact.
- Definition of impacts to water quality based upon impervious surface runoff, pollutant loading calculations, the effects of disturbance to adjacent contaminated sites.
- Mitigation to assure compliance with all state and federal regulations.

The results will be documented in a standalone Technical Report and summarized for inclusion in the DEIS/FEIS.

Recreational Uses

Objectives

The objectives of this effort are to completely document all Section 4(f) and Section 6(f) recreational properties in order to avoid them to the maximum practical extent. Where that is not practical or prudent, and there is an expected actual or constructive use (e.g., the activities/features/attributes of the protected site's vital functions are substantially impaired) of such property(ies), then Section 4(f)/6(f) documentation will be prepared for the DEIS/FEIS, including a Memorandum of Understanding to minimize harm to the resource.

Publicly-owned lands which have been formally designated and determined to be significant for park, recreation area, wildlife refuge or waterfowl refuge purposes represent Section 4(f) resources. And, even when they may not be functioning as such during project development, they are still considered 4(f). It is important to note that Section 4(f) applies to historic sites regardless of ownership type, but only to publicly-owned parks, recreation areas, and wildlife and waterfowl refuges.

State and local governments often obtain grants through the Land and Water Conservation Fund Act to acquire or make improvements to parks and recreation areas. Section 6(f) of this Act prohibits the conversation of property acquired or developed with these grants to a non-recreational purpose without the approval of the Department of Interior's National Park Service (NPS). Section 6(f) directs the NPS to assure that replacement lands of equal value, location and usefulness are provided as conditions to such conversions. Importantly, Section 6(f) applies to all transportation projects involving such conversion. Normally, any federally-funded transportation project requiring the conversion of recreational or park land covered by Section 6(f) will also involve Section 4(f).

Timing of Task: Month 2 to Month 10, inclusive; Month 14 to Month 19, inclusive; and, Month 27 to Month 29, inclusive.

Approach

A review of existing data sources/mapping and a field survey of publicly-owned recreational areas will be conducted to assist in the Illustrative Alternatives analysis. All of the identified Section 4(f) and Section 6(f) recreational areas will be mapped so they can be avoided to the maximum extent practicable.

If it is not prudent and feasible to avoid a Section 4(f) resource in the definition of the Practical Alternatives, the impacts will be minimized to the extent possible and those remaining will be mitigated. Any Section 4(f) resources that are impacted will be described and coordination with the officials with jurisdiction over the facility will occur. Coordination will also occur with the Department of Natural Resources, the Department of Interior and other resource agencies as needed. All coordination and meetings between officials with jurisdiction over Section 4(f) and Section 6(f) resources will be documented. If needed, a draft Section 4(f) and Section 6(f) evaluation will be written in the DEIS in accordance with 23 CFR 771.135 and Technical Advisory T6640.8A. A final Section 4(f) and Section 6(f) evaluation would then be included in the FEIS.

Assumptions

It is assumed an early definition of 6(f) resources will lead to a decision of inclusion in the Streamlining Agreement of the National Park Service. This is particularly important as the redevelopment of the Detroit River waterfront is being converted to publicly accessible parkland. While 6(f) resources are to be avoided, such a stretch of real estate along the Detroit River may use federal Land and Water Conservation Fund grants in its redevelopment. That will affect the alternatives' development and evaluation process.

Deliverables

This task will provide data as input to the definition and evaluation of both Illustrative and Practical Alternatives. If Sections 4(f)/6(f) impacts are encountered, coordination will occur with officials with jurisdiction over such properties. All Sections 4(f)/6(f) documentation will then be prepared, including draft Memoranda of Agreement with the National Park Service.

Community Impact Assessment/Environmental Justice and Title VI Issues

Objectives

Community Impact Assessment (CIA) is a process used to inventory and evaluate the effects of a transportation action on a community and its quality of life. Information gathered through the CIA process is used as a basis for decision-making during development, refinement and selection of Illustrative and Practical Alternatives. Although the steps in this CIA process are logically sequential, communities are dynamic; therefore, the Consultant will re-evaluate findings and make adjustments, as necessary, as the project evolves.

Proactive community involvement is an integral part of CIA. Outreach will lead to decision-making that is more likely to be responsive to community concerns and goals, resulting in greater community understanding of proposed transportation improvements, enhancing MDOT/FHWA credibility, and ensuring non-discrimination. By identifying and alerting decision-makers to civil rights issues, the potential for disproportionately high and adverse effects on protected populations can be addressed and resolved early in the transportation development process.

Title VI of the Civil Rights Act of 1964 (42 USC 2000(d)-2000(d)(1)) requires federal agencies to ensure that no person, on the grounds of race, color, or national origin, be excluded from participation in, denied the benefits of, or subject to discrimination under any program or activity receiving federal financial assistance. A proposed project that has the potential for disproportionately high and adverse effects on populations protected by Title VI shall only be carried out if:

- A substantial need for the project exists, based on the overall public interest; and
- Alternatives that would have less adverse effects on protected populations have either:
  - Adverse social, economic, environmental, or human health impacts that are more severe; or
  - Would involve increased costs of an extraordinary magnitude.

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" requires that federal agencies identify and address disproportionately high and/or adverse human health or environmental effects of their programs, policies, and activities upon minority and low-income populations. The fundamental Environmental Justice principles are:

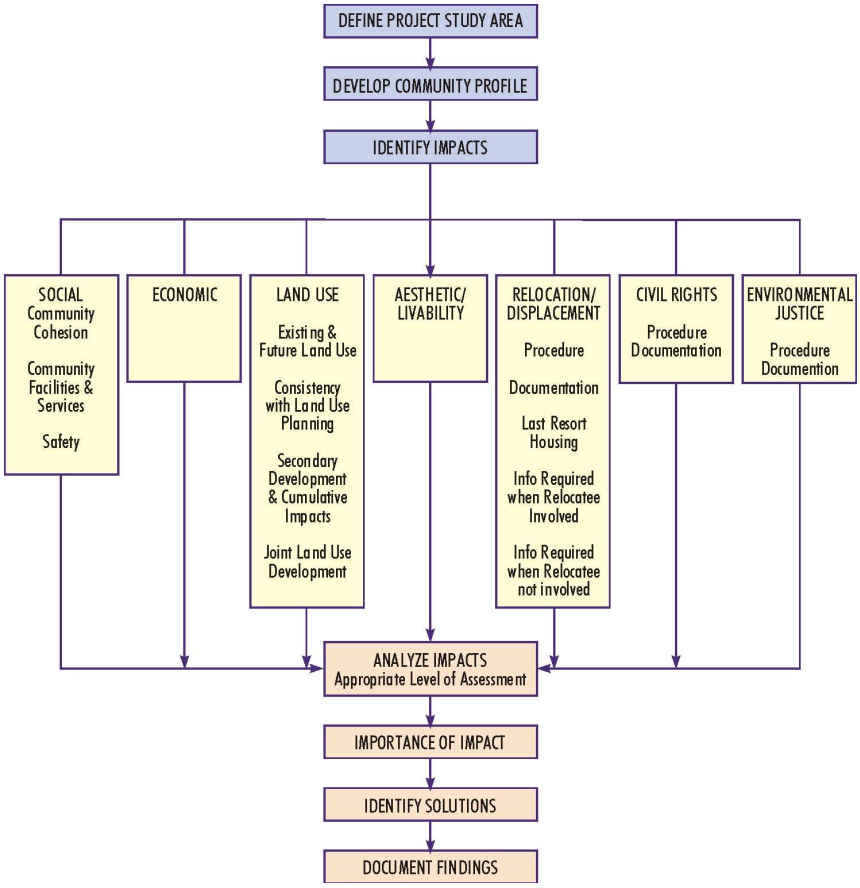
- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To provide for the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in, the receipt of benefits by minority and low-income populations.

Timing of Task: Month 13 to Month 19½, inclusive, and Month 27 to Month 29, inclusive.

Approach

The following methodology will be used in defining the DRIC proposals' community impacts (Figure 5).

Figure 5
Community Impact Assessment Process Flow Chart



Step 1: Analyze Data/Refine CIA Area

The definition of the CIA area will require study of the neighborhood/community relationships with the transportation facilities serving them. To do so, aerial photography will first be examined to assess the extent to which land use and transportation developments have occurred over the last 70 years. Next, the 1990 and 2000 U.S. Census data will be analyzed to locate those populations covered by EJ and to ensure all populations are properly considered to address Title VI issues. For the evaluation of Practical Alternatives, secondary sources, such as leaders of religious and educational institutions, nonprofit organizations and social service agencies, will be consulted to identify key populations. Based on previous work by the Consultant in a large portion of the study area, those key population groups will likely include the following:

- Arab
- Asian
- Black or African-American
- English

- French (except Basque)
- German
- Hispanic/Latino
- Irish
- Italian
- Polish
- Scottish

It is noteworthy that the Black/African American, Asian and Hispanic/Latino populations are covered by the Environmental Justice regulations. Also covered by Environmental Justice are American Indians and Native Hawaiians/other Pacific Islanders and those households with income below the poverty level.

Step 2: Inventory/Map Community/Cultural Facilities

Using GIS databases, various facilities that define the social/cultural conditions, as well as the economic fabric of the areas, will be mapped. These facilities include employer locations, religious institutions, schools, parks, shopping centers, community/recreational centers, libraries, hospitals, fire stations, police stations, groceries, laundromats, and banks. They will be field verified.

Step 3: Review Preliminary Findings

The preliminary findings of Steps 1 and 2 will be presented to the MDOT specialist for review/action. When refined, the data inventory will be presented to the Working Group, the Local Advisory Council and the Local Agency Group for comment. The involvement of these groups will help identify specific groups/individuals with which/whom to consult to define the facilities/services and concerns/opportunities confronting the key population groups. The public will also be presented the opportunity to comment on this matter.

Step 4: Conduct Evaluation

The following impacts will be defined for those key populations identified above:

- Mobility
- Economic Impacts
- Land Use
- Community Effects
- Air Quality
- Noise
- Water Quality

Assumptions

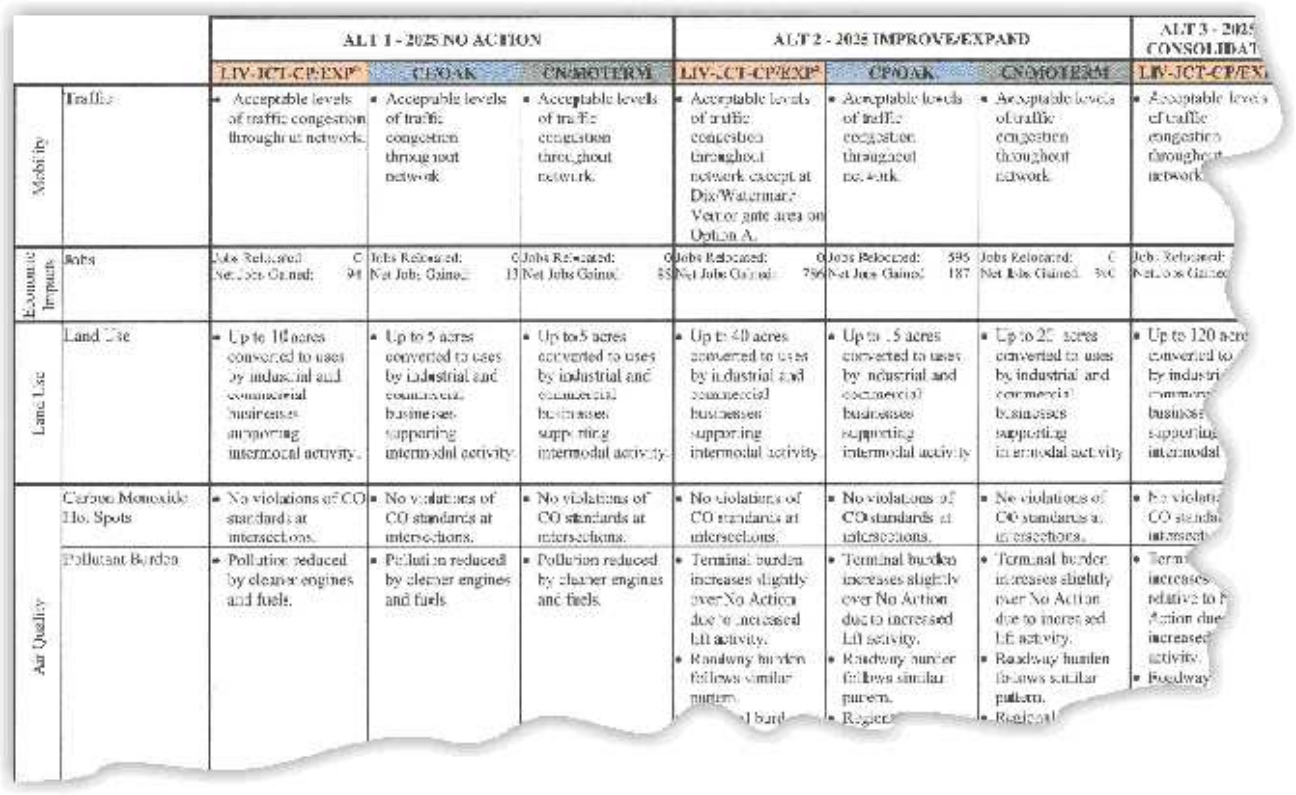
It is assumed the work here will be closely coordinated with the Indirect and Cumulative Effects Analysis. The MDOT Social/Environmental Justice Specialist will be engaged in each

step of the analysis/documentation process. Monthly coordination will be an essential part of executing this task.

Deliverables

The early results of the Community Impact Assessment, EJ and Title VI studies will be documented as input to the Scoping Document and then in at least one Technical Report to support the DEIS/FEIS. That information will be summarized for inclusion in the DEIS/FEIS. The results will also be summarized by alternative for use in the alternatives evaluation process. An example of the latter summary from the Detroit Intermodal Freight Terminal Study is shown on Table 1.

Table 1
Examples of Evaluation Data for the Detroit Intermodal Freight Terminal Study Used in the EJ/Title VI Analysis



		ALT 1 - 2025 NO ACTION			ALT 2 - 2025 IMPROVE/EXPAND			ALT 3 - 2025 CONSOLIDAT
		LIV-JCT-CP/EXP	CP/OAK	CN/MOTERM	LIV-JCT-CP/EXP	CP/OAK	CN/MOTERM	LIV-JCT-CP/EX
Mobility	Traffic	• Acceptable levels of traffic congestion throughout network.	• Acceptable levels of traffic congestion throughout network	• Acceptable levels of traffic congestion throughout network.	• Acceptable levels of traffic congestion throughout network except at Dix/Watermark/ Venoy gate area on Option A.	• Acceptable levels of traffic congestion throughout network.	• Acceptable levels of traffic congestion throughout network.	• Acceptable levels of traffic congestion throughout network.
Economic Impacts	Jobs	Jobs Relocated: 0 Net Jobs Gained: 94	Jobs Relocated: 0 Net Jobs Gained: 13	Jobs Relocated: 0 Net Jobs Gained: 85	Jobs Relocated: 0 Net Jobs Gained: 796	Jobs Relocated: 595 Net Jobs Gained: 187	Jobs Relocated: 0 Net Jobs Gained: 365	Jobs Relocated: Net Jobs Gained:
Land Use	Land Use	• Up to 10 acres converted to uses by industrial and commercial businesses supporting intermodal activity.	• Up to 5 acres converted to uses by industrial and commercial businesses supporting intermodal activity	• Up to 5 acres converted to uses by industrial and commercial businesses supporting intermodal activity	• Up to 40 acres converted to uses by industrial and commercial businesses supporting intermodal activity	• Up to 15 acres converted to uses by industrial and commercial businesses supporting intermodal activity	• Up to 25 acres converted to uses by industrial and commercial businesses supporting intermodal activity	• Up to 120 acres converted to by industri commerc business supporting intermodal
Air Quality	Carbon Monoxide Hot Spots	• No violations of CO standards at intersections.	• No violations of CO standards at intersections.	• No violations of CO standards at intersections.	• No violations of CO standards at intersections.	• No violations of CO standards at intersections.	• No violations of CO standards at intersections.	• No violati CO standa intersect
	Pollutant Burden	• Pollution reduced by cleaner engines and fuels.	• Pollution reduced by cleaner engines and fuels	• Pollution reduced by cleaner engines and fuels	• Terminal burden increases slightly over No Action due to increased LH activity. • Roadway burden follows similar pattern.	• Terminal burden increases slightly over No Action due to increased LH activity. • Roadway burden follows similar pattern. • Regional	• Terminal burden increases slightly over No Action due to increased LH activity. • Roadway burden follows similar pattern. • Regional	• Term increase relative to Action due increased activity. • Roadway

Indirect and Cumulative Effects

Objectives

The purpose of this task is to measure those indirect (secondary) and cumulative effects associated with the proposed border crossing developments. The basis upon which the analysis will be conducted is defined in federal guidance, which includes:

> Indirect (Secondary) Effects – Caused by the action (border crossing and roadway connections) and occurring later in time and farther removed in distance, but occurring in the reasonably foreseeable future (40 CFR 1508.8(b)).
>
> Cumulative Effects – Resulting from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions.

Timing of Task: Month 13 to Month 20½, inclusive, and Month 27 to Month 29, inclusive.

Approach

To initiate the analysis of indirect and cumulative effects, the historic trends as well as projections of future conditions at both the regional and local/corridor levels will be reviewed in the areas of:

- Population and community development
- Employment
  - Labor force
  - Employers
  - Unemployment
- Roadway development
- Other infrastructure
  - Water
  - Sewer
  - Transit

Then for each corridor, a "zone of influence" will be defined within which the following impacts will be measured:

- Mobility
  - Traffic changes associated with creating the DIFT
- Economic Impacts
  - Jobs
- Land Use
  - Conversion of land uses
- Cultural Resources
  - Change in historic/archaeologic resources
  - Change in parklands

- Community Effects
  - Number of residential units and business properties potentially affected
  - Effects on community cohesion
  - Potential environmental justice issues
  - Change in economic vitality
  - Change in aesthetics
- Air Quality
  - Localized carbon monoxide air emissions
  - Regional air quality effect
- Noise
  - Noise exposure of sensitive receptors (e.g., schools, places of worship, residential properties)
- Water
  - Water quantity and quality
  - Quantity and quality of wetlands affected

A key tool to be used in this analysis of indirect/cumulative effects will be different distributions of future population and employment for the Practical Alternatives, compared to SEMCOG's forecasts. This will done to recognize that major transportation investments, such as the DRIC, affect accessibility and, therefore, land development patterns. Traditional transportation planning analyses utilize a single set of population and employment distributions as inputs to the regional travel demand model to generate traffic forecasts and regional performance measures. Federal court decisions[1] have rendered such an approach obsolete and susceptible to litigation by groups opposed to the Recommended Alternative. In contrast, the Consultant's process recognizes that changes in land accessibility, induced by transportation improvements, influence land development patterns, which in turn influence traffic volumes and congestion.

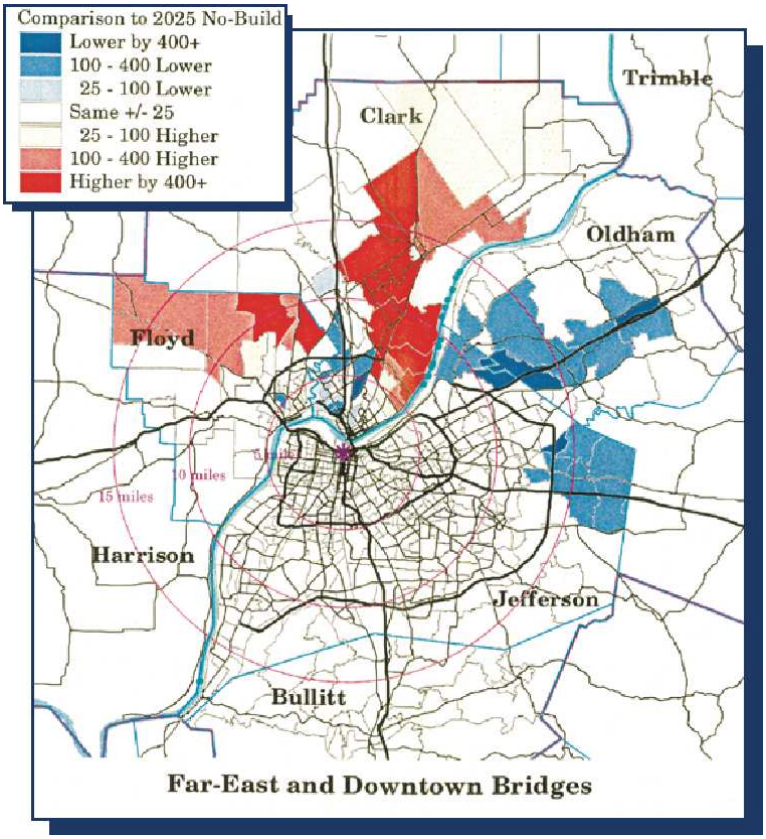
This methodology has been used successfully by the Consultant on the M-15 Widening EIS and in the EIS analysis of new bridges over the Ohio River in Louisville, Ky. Figure 6 illustrates the forecasted differences in 2025 population and employment between the No-Build and the new-bridges alternative in the Louisville project. These kinds of shifts will be forecast for the DRIC Practical Alternatives. Changes that can be expected in sprawl, air quality, congestion, mobility, access to jobs, and employment will be documented.

Assumptions

It is assumed the ICE will be closely coordinated with the EJ and Title VI analyses. MDOT's Social/Environmental Justice Specialist will be engaged in each step of the analysis/documentation process. Monthly coordination will be an essential part of executing this task.

[1] On January 16, 1997, the U.S. District Court, Northern District of Illinois ruled that the Record of Decision for FAP Route 340 (I-355 South Extension) was invalid, because the EIS used a single set of population and employment forecasts as inputs to the regional travel demand model for both the "No Action" and "Build" alternatives.

Figure 6
Example Output of Population/Employment Redistribution as Input to Indirect/Cumulative Effects Analysis



Deliverables

The results of the Indirect and Cumulative Effects analysis will be documented in a Technical Report that supports the DEIS. Its contents will be summarized for the DEIS/FEIS. The results will also be summarized by alternative for use in the alternatives evaluation process.

Wetland Delineation, Assessment and Mitigation

Objectives

Review of the study area for wetlands is necessary to: determine potential impacts associated with alternative border crossings; identify alternative methods and locations to minimize impacts; comply with state and federal regulations; and, comply with federal policy on “no net loss.” Given the urban nature of the study area, the majority of wetlands are anticipated to be associated with the Detroit River, including nearshore areas and islands.

The work plan identified below is proposed in a sequence designed to provide reliable data while controlling the field work. Detailed delineations are proposed only after Practical

Alternatives are identified. In addition, wetland assessments, threatened and endangered species assessments, and mitigation site assessments are proposed to be conducted concurrently to integrate the work effort.

Timing of Task: Month 2 to Month 10, inclusive; Month 14 to Month 20, inclusive; and, Month 25 to Month 29, inclusive.

Approach

The approach will involve five tasks:

- Existing Resource Analysis (Illustrative Alternatives)
- Preliminary Mapping of Wetlands (Illustrative Alternatives)
- Wetland Delineation/Functional Assessment (Practical Alternatives)
- Identification of Mitigation Sites (Practical Alternatives)
- Report Preparation

Existing Resource Analysis (Illustrative Alternatives)

The Consultant will obtain pertinent wetland mapping information from, but not limited to, the Michigan Department of Natural Resources (MDNR), Southeast Michigan Council of Governments (SEMCOG), U. S. Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers (USCOE), the Michigan Department of Environmental Quality (MDEQ), the United States Department of Agriculture (USDA), Wayne County, the City of Detroit, and Grosse Ile Township. The information will include, but not be limited to the following:

- The National Wetlands Inventory Map
- Michigan Resource Inventory System overlays
- USDA soils maps
- Grosse Ile's wetland inventory maps
- Other wetland mapping information from state, federal, and local agencies.

The wetland mapping information will be over-laid on aerial photographs using ArcView software.

Preliminary Mapping of Wetlands (Illustrative Alternatives)

Based on the above-referenced mapping, professional wetland scientists will field review the study area to determine the extent and approximate location of wetlands. Wetlands within Grosse Ile Township will be identified using the Township's wetland inventory map only. All wetlands encountered will be sketched on an aerial photograph and created as an ArcView file. Approximate size of each wetland complex will be calculated and determinations will be made as to the regulatory status of each area based on state and federal criteria.

During the preliminary assessment, wetland functions will be identified and values assigned based on the vegetative communities present, physical land features, proximity to waterways,

hydrology, size, and location. Each wetland complex will be classified by plant community as being forested, emergent, scrub shrub, and/or open water. In cases where a wetland complex is composed of more than one wetland classification, the percent of each wetland type will be estimated in the field. Photographs will also be taken of each area to provide a visual record of the wetland types present.

Preliminary wetland maps, wetland sizes, and functions and values will be compiled and submitted for preliminary definition and assessments of Illustrative Alternatives.

Wetland Delineations/Assessments (Practical Alternatives)

Professional wetland scientists will delineate all wetland boundaries within areas identified as Practical Alternatives by placing high visibility glow-pink flagging tape at the upland/wetland interface and sequentially lettering and numbering each flag. Preliminary sketches developed earlier through field work will be refined.

The delineation methodology will be based on Part 303, Wetland Protection, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and guidance manuals and procedures set forth by the MDEQ for delineating wetlands in Michigan (Michigan Department of Environmental Quality 2000). The methodology utilized by the US Army Corps of Engineers will also be employed, as deemed appropriate. These methods used to identify wetland boundaries will be based on the following:

- Predominance of wetland vegetation
- Visual signs of hydrology
  - ✓ Buttressed root systems
  - ✓ Hummocked ground surface
  - ✓ Dark stained leaves
  - ✓ Saturated soils within 12 inches of the surface
  - ✓ Water standing above the ground surface
- Visual topographic breaks
- Presence of hydric soils
  - ✓ Dark surface soils with subsurface A horizon soils having a reduced matrix (chroma 2 or less) and redoximorphic concentrations within 12” of the surface
  - ✓ Dark surface soils with subsurface A horizon soils having a reduced matrix (chroma 1 or less)
  - ✓ within 12” of the surface
  - ✓ Any hydric soil indicator listed in “Field Indicators of Hydric Soils in the United States” (USDA 1998)

The Geographic Information System (GIS) software ArcView 8.3 (ESRI, Inc.) will be used to create wetland maps by developing shape files for each wetland area based on field sketches. Acreages will be calculated for each wetland area and wetland type using an ArcView script.

Functional/qualitative wetland assessments will be made after field inspection of each of the wetland areas and documenting plant communities, hydrologic regimes, location, size, proximity to waterways, and wildlife use. Qualitative assessments and Floristic Quality Assessments (FQA) will describe functions, values, benefits, and uses that each wetland provides to both biotic resources and humans. These functions and values include the following:

- Flood and storm water control
- Wildlife habitat for mammals
- Wildlife habitat for waterfowl
- Wildlife habitat for amphibians and reptiles
- Wildlife habitat for songbirds
- Wildlife hub
- Wildlife spoke/corridor
- Fish habitat
- Supports state or federally endangered or threatened plants, fish, or wildlife
- Habitat for state or federally endangered or threatened plants, fish, or wildlife
- Protection of subsurface water resources (groundwater recharge)
- Filtration and nutrient uptake
- Pollution treatment (biological and chemical oxidation basin)
- Erosion control
- Provide nutrient inputs for down gradient water food cycles
- Aesthetics; Natural beauty

Each wetland complex will be rated as low, medium or high based on the presence/absence of functions/values and the degree of benefits those functions/values provide. This method has been used on prior MDOT projects and was favored over more formal methodologies such as WET and EPW which can sometimes limit expression of a wetland functions, benefits, values, and/or uses.

MDNR's Floristic Quality Assessment program will also be used to assess functional values associated with floristic quality. This program calculates several metrics based on the type and diversity of plant species present within a given area. These metrics are used to identify the significance of wetland plant communities and their potential to harbor state or federally threatened, endangered, candidate, or special concern plant and animal species.

Identify Potential Mitigation Sites (Practical Alternatives)

While conducting the wetland assessments, the Consultant will record the presence and location of any upland or wetland sites that may be potential locations for wetland restoration, enhancement, and/or creation. The sites identified will be prioritized based on location, size, area needed for mitigation, wetland types requiring replacement, and probability of mitigation success.

Report Preparation

A report will be prepared to include:

- Methodologies
- Mapping/photos showing the location of each wetland assessed and/or delineated
- Descriptions of each wetland
- Plant lists for each wetland
- FQA for each wetland
- Area of each wetland impacted by Illustrative, Practical, and Recommended Alternatives
- The area of impact for each wetland type for each alternative
- Mitigation requirements (acreage and type) for each of the alternatives
- Location of potential mitigation sites and potential for success at each site
- Discussions and recommendations

The report will also include discussions and recommendations regarding indirect and cumulative impacts including fragmentation, separation, and future anticipated impacts within the study area. Recommendations will address location, design and construction methodology and will be based on the type, location, amount, and quality of wetland impacted (directly and indirectly).

The report will identify federal and state permit and mitigation requirements associated with impacts to wetlands and the Detroit River (Parts 303 and 301 of NREPA respectively). However, all wetlands, regardless of regulatory status, will be included in calculations for mitigation requirements. Non-traditional mitigation will also be discussed including potential river habitat restoration, wetland preservations, fisheries habitat improvement projects, wildlife habitat improvement projects, and other potential mitigation within the Detroit River and the St. Clair System. These non-traditional projects can lead to significant improvements to the aquatic resources, compensate for unavoidable impacts, and reduce costs of mitigation.

Assumptions

The approach that will be taken here is based on the assumption that the majority of the project area consists of urban land and the primary focus of the assessments will be associated with the Detroit River and nearshore areas surrounding islands and the Michigan shoreline.

Deliverables

The products of this work are elaborated upon in the discussion presented above. To summarize, the deliverables of this will be a Technical Report which covers wetland delineation, functional assessment and mitigation.

The document will be summarized for inclusion in the DEIS/FEIS.

Visual Resources/Aesthetics

Objectives

The Council on Environmental Quality (CEQ) regulations identify aesthetics as one of the factors which must be considered in determining the effects of a federal action. MDOT's Context Sensitive Design process addresses the visual quality of highways and bridges in their design in relation to features such as landscaping, parks and historic places, and the use of art forms and the screening of unsightly surrounding uses. MDOT's approach is to assure design solutions are compatible with the surrounding environment and community desires while preserving the human and natural environments. The intent is to provide the "user" and community "viewer" a transportation facility/system that is pleasing to the senses, assimilates the visual qualities of a community's visual resources into its design, and makes the transportation facility/system compatible with the community-at-large.

Visual impacts affect communities from two perspectives: 1) the view from the facility; and, 2) the view of the facility. The view from the facility is from the user's perspective and leaves a lasting impression of the community, area or region. The view of the facility contributes to the feeling of community value and pride. Visual impacts of an area are ascertained by defining the visual environment, identifying key views, analyzing the resources and community responses, depicting the project appearance, assessing the visual impacts, and then developing mitigation measures all in concert with the affected community, local and regional agencies and private interest groups.

Timing of Task: Month 2 to Month 10, inclusive; Month 13 to Month 18¼, inclusive; and, Month 27 to Month 29, inclusive.

Approach

This effort will begin with an inventory of the existing significant landscape and architecture, and other visual resources within the study area. The use of oblique aerial photography and an on-the-ground inventory will be key parts of the effort. The work will also include a description of the way the aesthetic design elements of a border crossing and related roadways can be integrated into different settings. The local areas that are recognized as critical or sensitive which will be inventoried at the Illustrative Alternatives definition/evaluation phase include:

- Residential areas,
- Areas of recognized beauty (local, state, national),
- Parks and recreation areas,
- Historic or other culturally-important resources,
- Entry to urban areas,
- Water bodies,
- Public facilities of significance (hospitals, colleges, universities),
- Private facilities of significance (business centers, office complexes).

For the analysis of Practical Alternatives, two public workshops on visual/aesthetic issues will be conducted. The first will be an afternoon/evening meeting using the combined public forum and formal presentation-Q/A formats. It will be designed to review the project to date, and engage the community in a discussion of desired aesthetic improvements. A survey form will be distributed to allow those in attendance, and others that are part of the outreach effort, to define the sensitivity perceptions to the following items:

- Design compatibility with neighborhood setting,
- Specific historic or cultural features,
- Vegetation screening,
- Open spaces,
- River cleanliness,
- Clutter,
- Color coordination,
- Light and lighting,
- Noise, odors.

One hundred disposable cameras will also be available for workshop participants to use to illustrate those design/aesthetic treatments in their community and in places they visit that they find attractive and those about which they have concerns. The cameras are to be returned within 30 days of the first workshop.

The second workshop will be an all-day-into-the-evening event. It will incorporate the photos taken by the community. It will be an "imagination" workshop at which the public can work with the consultant and its computer animation software to design their own aesthetic treatments of the border crossing infrastructure, including the crossing, if it were a bridge. These will then be produced in color at the workshop for display. The products of this workshop may be also displayed at a local event, such as a festival, so the public may be further engaged in the aesthetic treatment of the border crossing facilities.

It is recommended to the Working Group that, in addition to the workshops, a two-day tour of unique aesthetic treatment projects be conducted for interested parties. The tour would include a study of bridges as well as quality/successful aesthetic urban treatments that have been produced by MDOT's Enhancement Project Program. It is expected the tour will last two days, leaving the morning of the first day and returning on the evening of the second day.

On Day 1, the first stop will be a walking tour of a successful project. Then, local experts from the toured community will be engaged in a luncheon discussion of the project and its funding, maintenance and public/private partnership opportunities. The afternoon/evening of the first day will allow the tour group to similarly view a second interesting project and engage another local group at a different location. Day 2 will cover two to three different projects/communities. The tour may include an out-of-state stop, e.g., Buffalo.

The tour can be conducted on a weekend, if it is possible for local representatives to share that time with MDOT. Otherwise, two weekdays (Wednesday and Thursday) appear to be

the best. Finally, it is proposed the tour be conducted between the first and second workshop. The expenses of all participants will be part of the project's cost.

Based on the visual/aesthetics analysis, the road/bridge design efforts will include the use of unique or significant construction materials, landscaping, screening, color, the incorporation of architectural features, earthwork and litter control.

If historic resource issues are affected by the visual presence of the border crossing infrastructure, particularly a bridge, the design will be coordinated with the State Historic Preservation Office and other appropriate agencies according to the requirements of the National Historic Preservation Act.

Assumptions

It is assumed that the State Historic Preservation Office will participate in the Streamlining Agreement. Also, that the Partnership Working Group will provide timely review of the two workshop formats and meeting content. Finally, it is anticipated the Working Group will allow the two-day tour to be conducted on a basis it approves.

Deliverables

This work will define the essential elements of the study area communities' landscape, architecture and other visual resources for the Illustrative Alternatives definition/evaluation phase. For the Practical Alternatives, the community's perspective of the needs for visual/aesthetic treatments will be documented. Those elements will then be translated into the design work and then into visualization products through animation of the design. It is now expected that a variety of treatments will be developed reflecting the different influences of each set of neighborhoods/areas affected by the possible landing of the border crossing, particularly if it is a bridge.

For the Recommended Alternative, the earlier design/visualization efforts will be refined and enhanced. A final deliverable will be complete documentation of the communication/public engagement process.

P/PMS Task 2810 – Conduct Initial Site Assessment (ISA)

Objectives

It is the purpose of this work to identify all sites that have contamination and develop appropriate mitigation measures. The nature of these contaminants by site will be relayed to the MDOT Real Estate Division so that the Conceptual Relocation Plan can account for them.

Timing: Month 3 to Month 9, inclusive.

Approach

The Initial Site Assessment (ISA) represents the first step in the due diligence process, which seeks to determine the environmental condition of a parcel of real property before it is acquired by MDOT. Additional due diligence in the form of a Preliminary Site Investigation (PSI) is required for certain parcels to confirm the presence of contamination (see Task 2820).

The scope of work for the ISA consists of a review of environmental and historical land use records and field reconnaissance. Federal and state environmental databases/lists of known contaminated sites and those under investigation will be reviewed for the study area. These data will be obtained from a records search company and from reviews conducted at MDEQ offices. Local agencies will also be contacted for environmental records/information concerning local sites with known and suspected contamination. Historical aerial photographs and maps will be examined to identify former industrial sites, unpermitted landfills, manufactured gas plants and other sites that are often associated with environmental contamination.

A field reconnaissance of the study area will be conducted to identify current land uses including the potential for hazardous material handling and contamination. This task will include inspections and interviews of owners/occupants of commercial/industrial properties within the study area. This work will be coordinated with MDOT's Real Estate staff.

Assumptions

The Study Area is so industrialized and this task so critical to advancing the project, if it is approved, that the work here is assumed to be extensive. So, a two-step approach will be taken to manage the work for the Illustrative Alternatives evaluation by maximizing records research versus field work. The Practical Alternatives evaluation will depend on more extensive field investigations discussed in the following task.

Deliverables

The results of the records review and field reconnaissance work will be presented in the ISA. It will form the basis for identifying parcels of property that will require a Preliminary Site Investigation (PSI) to identify/more completely address potential contamination impacts.

P/PMS Task 2820 – Conduct Preliminary Site Investigation (PSI) for Contamination

Objectives

This work will follow the PSI and provide more detailed information of those sites potentially contaminated that will be affected by the Practical Alternatives.

Timing: Month 15 to Month 18, inclusive, and Month 27 to Month 29, inclusive.

Approach

A Preliminary Site Investigation (PSI) will be conducted at selected sites identified by the PACS as potentially affected by hazardous or polluting materials for which access can be obtained. The PSI involves the collection and chemical analyses of soil and/or water samples from individual sites. Information gathered by the PSI is used to confirm the presence of surface and subsurface contamination and to assist in estimating the costs related to management or remediation of contamination.

The scope of work for the PSI assumes that investigations will be conducted at approximately 75 sites that are suspected of having contamination impacts. Those selected for the PSI will be heavy industrial sites or other sites with potentially complex environmental contamination issues. Contamination impacts from documented leaking underground storage tanks will not be investigated as part of the PSI because investigation and cleanup of these sites are regulated by the state UST program.

Prior to conducting onsite sampling and testing, an access agreement between the property owner and MDOT will be required. If such an agreement cannot be obtained, the subsurface drilling and sampling will be conducted in the adjacent public right-of-way (with permission from the applicable public owner). The scope of work assumes that an average of three soil test borings will be conducted per site and that the borings will not extend beyond the upper 20 feet or into bedrock. Five samples per site will be analyzed for volatile and semi-volatile organic compounds, metals and PCBs. The actual number of samples, media tested, and testing parameters for each site will depend on the contaminant source(s), site conditions and other factors.

Senior Consultant personnel who are experienced in performing site investigations will conduct the PSI. Specialized services, such as drilling and laboratory testing, will also be undertaken by the Consultant Team. A Worker Health and Safety Plan will be prepared by the Consultant to protect the study participants engaged in the field work.

Assumptions

The work will follow the PSA. It is assumed to be focused on 75 properties/sites. If field work (drilling) is required in public rights-of-way, MDOT assistance will be provided to gain permission.

Deliverables

A Preliminary Site Investigation Report will be prepared at the conclusion of this task. Its content will be used in the evaluation of Practical Alternatives and selecting the Recommended Alternative. The PSI Report's contents will be summarized for the DEIS/FEIS. Additional work (field analysis) will be specified and mitigation measures

documented. A Worker Health and Safety Plan will be prepared to protect the study participants doing field work.

P/PMS Task 3370 – Structure Study

Objectives

The objective of the Structure Study is to develop a technically sound solution for the river crossing component of the project, which may ultimately result in a bridge or a tunnel solution. The river crossing will be a critical component of the project and potentially the most visible and lasting symbol.

Work on this task will be coordinated and shared with the Canadian Consultant with an anticipated 50/50 split in effort. The following sections suggest a methodology for coordinating this work.

Timing of Task: Month 3 to Month 8, inclusive; Month 14 to Month 20, inclusive; and, Month 27 to Month 29, inclusive.

Approach

This task begins with obtaining all relevant information, such as the geotechnical report, available survey data for each location where a crossing will be considered, as well as other technical work by the Project Team such as traffic reports. This information will form the technical basis for developing crossing-type studies. Some of the critical tasks will be to:

- Work with the Canadian Consultant to develop a harmonized set of design standards and criteria for the structures and tunnels.
- Perform preliminary design and select structure and tunnel alternatives for each proposed location.
- Determine construction issues, limitations and cost estimate for each alternative.

The development of the crossing will be one point where coordination and work with the Canadian Consultant will be most critical. Steps include:

- Each consultant would be independently responsible for their approach structures, respecting differences in standard methodologies and economies in each country.
- During the Illustrative Alternative development, each consultant will develop preliminary size, type and location studies for potential alternatives. This population of structure types can then be reduced and divided between the two consultants for the preliminary design development of the Practical Alternatives.
- As an alternative, each consultant could be responsible for a particular structure type (e.g., cable stay or suspension) for design at each Practical Alternative location. This approach would reduce the risk of incompatibility of designs.

For the Illustrative Alternatives, conceptual structural studies will include the preliminary investigation of bridges and tunnels required for each alternative. Type, size and location (T,S&L) recommendations will be made. Preliminary pier locations and footprints will be identified to assess environmental and hydraulic impacts. The preliminary depth of the main structures will be determined and a profile established to provide the required vertical clearances.

Considerations will be given to the use of innovative and aesthetically pleasing structures, leading to a possible signature structure at each location. Different tunnel types will be evaluated including immersed tube, cut and cover, and bored tunnels. Consideration will be given to the potential to minimize environmental impacts in the various corridors while considering the cost factors.

For the Practical Alternatives, the structure types selected from the Illustrative Alternatives will be developed to a level of completion equivalent to approximately 15 to 20 percent of final design including, but not limited to, general plan and elevation drawings for the main span structure, major structural elements, such as towers, piers, general deck cross sections. Dimensioning of principal bridge components will make use of simple calculations and past experience to provide an initial estimate of component dimensions and relative costs. If a tunnel(s) is chosen for further analysis, preliminary design will include the same level of detail as the bridge structure with an emphasis on achieving tunnel safety and economic considerations.

The public will be engaged in the structure development/evaluation process. Again, the reader is referred to Task 1220 and the section on Indirect and Cumulative Effects for a complete discussion of the public engagement process in this work.

Assumptions

The corridor alignments and constraints will drive the crossing locations and structure types as well as tunnel considerations.

Deliverables

The products of this work will include:

- A harmonized set of design standards and evaluation criteria with the Canadian consultant.
- For the Illustrative Alternatives:
  - An evaluation of potential structure types, including tunnel versus bridge
  - An evaluation of each structure and tunnel type considered for Practical Alternatives that contains:
    - Location, type and size
    - Structure-specific data including foundation design and recommendation
    - Constructability issues and limitations
    - Economic comparison of bridge versus tunnel types.

- General Plan and Elevation drawings for the Practical Alternatives.
- 3D visualization of feasible structure types for each Practical Alternative.

P/PMS Task 3520 – Hydraulic/Hydrologic Analysis

Objective

The proposed corridor crosses significant natural water courses and resources. From the Great Lakes, to the Detroit River, to River Rouge and Turkey Creek, surrounding regions and communities rely on them for navigation, domestic water intake as well as outlet, recreation and environmental benefits. Providing a functional hydraulic design for the proposed transportation corridor while, protecting the existing water resources, is essential for the Hydraulic/Hydrologic (HH) analysis.

Timing of Task: Month 2 to Month 9, inclusive; Month 16 to Month 19, inclusive; and, Month 27 to Month 29, inclusive.

Approach

As part of the Early Preliminary Engineering for the DRIC, the hydraulic/hydrologic work will be conducted at a preliminary level in three steps:

- Establish a Data Inventory
- Assess Impacts
- Provide a Conceptual HH Design

Establish Data Inventory

This inventory of data is extensive and includes:

- Historic drainage issues
- Reports/studies related to U.S. waters
- Local drainage improvement plans
- Ground water/geotechnical information
- Local contour and topographic maps
- Municipal storm sewer or combined sewer system as-built plans
- Pertinent environmental regulations, namely the National Pollutant Discharge Elimination Systems Phase II rules
- Flood insurance study and models
- Bridge plans
- Floodwall plans
- Levee plans
- River navigation plan
- River operation plan
- Underwater bridge inspection record

- Geotechnical report
- River flow and stage records.

This task will also involve field surveys and inspections of the existing system including all bridges, floodwalls, small structures, culverts and drainage systems within each project corridor.

To establish the base-line hydrologic models the hydraulic model for the Detroit River and its tributary courses will be obtained from USCOE, FEMA, US Coast Guard, MDEQ or OMNR.

Assess Impacts

Models pertaining to a watershed-wide drainage will also be inventoried. Where there are no applicable data, SCS TR-20 or TR-55 methods will be used to estimate discharge rates along the project corridor. CADD files will be created to incorporate the drainage areas, contributing flows, the existing drainage pattern and the existing drainage systems.

Beginning with the examination of data collected in the inventory, key issues related to Hydraulic/Hydrology impacts will be identified for both flood control and storm water environmental compliance. Examples of these issues include:

- Bridge geometrics, including opening, pier size, location and shape
- Bridge stability evaluation under various scour conditions due to a 500-year flood event, ice jamming, river bed movements and channel dragging
- The latest bridge scour protection techniques
- Bridge deck drainage collection and discharge
- Flood control measures such as floodwall and/or diversion
- Floodplain and wetland impact mitigation
- Shore line protection needs due to wave action induce by navigation traffic and the prevailing wind.
- Adequacy of the existing drainage facilities at receiving end of the project
- Project wide discharge outlets and discharge environmental requirements
- Combined sewer separation requirements for the proposed corridor
- Additional right-of-way needs for drainage
- Potential ground water impacts of the proposed project, such as low roadway profile, excavation dewatering and subdrain system
- Potential utilities impacted by the proposed drainage systems
- Ponding requirement for storm water rate control and quality improvements
- Temporary drainage requirements
- Construction site erosion and sediment control measures, structure or non-structure Best Management Practices (BMPs)
- Maintenance program
- HH value engineering for cost reduction

Prepare Plan

Water Resources meetings will be held to coordinate and resolve drainage related issues with the agencies consisting of MDOT, MDEQ, FHWA, EPA, USGS, USCOE, OMNR, municipalities and other pertinent stakeholders

Collaboration will also be maintained with the DRIC engineering team to recommend a conceptual crossing, roadway, and drainage system design plan. Input to this plan will be provided through application of hydraulic and hydrologic models to ensure no increase in high water elevation increase as result of the project. Other analysis will include preliminary hydraulic modeling for the proposed major ponds, major culverts, and bridges and bridge hydraulic and scour analysis. Bridge scour depths, flow depth, flow velocity and any related hydraulic parameters will be established.

Assumptions

The following assumption are key to conducting the work in this task:

- The existing available data will be sufficient for the study and no hydraulic survey will be available at this stage.
- The USCOE has established a hydraulic model for the Detroit River and it is acceptable to the Canadian agencies.
- A one-dimensional hydraulic model, such as HEC-2, HEC-Ras, WSPRO, is acceptable for EPE. A more numerically accurate two dimensional model USCOE SMS-2 model is not part of this scope.

Deliverables

The Consultant will develop a storm water management plan documenting the drainage design and resolutions. The plan will contain the following:

- Information on the source of data and the data obtained;
- An analysis of the data in regard to flood plain widths, high water surfaces for structure alternatives, etc.;
- Drainage system layouts in CADD format; and,
- Analysis Results.

The Consultant will also develop a Bridge Scour Report. The format of the report will include a summary, discussion, conclusion and appendices. The summary will present the results of the river modeling including scour depth, flow depth, flow velocity and any additional recommendations. The report will document the analysis approach, all assumptions, results of the modeling and findings. The appendices will contain agency correspondence, calculations and all computer model back-up. An electronic copy of the document text and all computer models will be submitted with the report

P/PMS Task 3530 – Foundation Investigation

Objective

The objective of this task is to: evaluate the data presented in the preliminary geotechnical report; determine the extent of additional investigation that may be required to adequately define subsurface conditions at the remaining river crossing corridors under consideration; and, conduct field investigations to provide geotechnical recommendations regarding foundations and construction for the selected structures.

Timing of Task: Month 3 to Month 7, inclusive; Month 14 to Month 20, inclusive; and, Month 27 to Month 29, inclusive.

Approach

Depending on the results of the preliminary geotechnical investigation of Task 2330, additional geotechnical information will be developed for Practical Alternative to evaluate constructability issues. To do so, the following services will be performed:

- Advanced each boring through the overburden soils and approximately 10 feet into bedrock. For each crossing, two borings will be drilled on the river bank and two borings will be drilled within the Detroit River. Roadway borings will total 60, one every 1,000 feet. Grade separation borings will total ten.

- Collect samples in accordance with the standard penetration test method (ASTM D1586) at 2.5-foot intervals within the upper 10 feet and at 5-foot intervals thereafter. Approximately six Shelby tube samples will be taken of the soft clay (ASTM D1587). Rock core samples will be obtained with NX wire-line techniques and the samples logged and photographed. At the completion of drilling operations, the boreholes will be backfilled with grout.

- Drill test borings within the river from a barge. Permits will be obtained, as required. Based on the anticipated drilling depths, it is expected the total drilling footage will be on the order of 600 to 780 feet (including water depth) and 50 feet of rock coring at each crossing location. All borings will be grouted in their entirety.

- Perform laboratory testing on soil samples to define the engineering properties and applicable design parameters for the subsoil strata. Testing will include determining natural moisture content, dry density, grain size distribution and unconfined compression strength of cohesive samples.

Once the Recommended Alternative has been identified, a more detailed geotechnical investigation is proposed between the end of the EPE/EIS phase and the start of the design phase for the project. This will allow MDOT and the Partnership more flexibility in determining the method of delivery, (i.e. Design/Build, or other non-traditional methods) most

suitable to this type project and its aggressive schedule. This geotechnical work for the Recommended Alternative would consist of the following:

- Test borings extending approximately 10 feet into bedrock at 500 to 750 feet on-center for a tunnel crossing or at the major foundation locations if a bridge is desired. Various additional borings will be required at ancillary facilities such as bridge approach elements, buildings, retaining walls, etc.

- Preparation of a detailed geotechnical analysis suitable for inclusion in the Engineering Report and bidding documents. For a bridge, the analysis will include recommended foundation construction methods and design parameters, etc. For a tunnel, documentation of the tunnel envelope will be critical. The report for a tunnel will also include recommended tunnel construction methods such as Tunnel Boring Machine requirements, shaft construction, tunnel liner, etc.

Assumptions

The assumptions guiding this work are: there will be two Practical Alternatives; permits will be obtained without complications; and, land-based sites will be accessible with truck-mounted drilling equipment.

Deliverables

A geotechnical engineering report will be prepared to include Logs of Test Borings, the test boring location plan, feasibility evaluations for the proposed crossing structures, be they bridge or tunnel, construction considerations, risks, and an assessment of the advantages and disadvantages of each particular. A cost estimate for the foundation elements of the bridge and tunnel concepts will also be prepared. Likewise, conceptual schedules for construction of underground elements of the various options will be defined.