Appendix L - Three Modifications to the DEIS Build Alternative

APPENDIX L

The following information further describes the selection process and design considerations for the Recommended Alternative. The information includes:

1. Modifications to the DEIS Build Alternative
2. Comparison of Practical Alternatives and Selection of the Recommended Alternative
3. Refinements to the Recommended Alternative
4. Potential Staging Options Associated with the Recommended Alternative
5. Design of the Recommended Alternative
6. Value Engineering
7. Evaluation of the Recommended Alternative in Relation to Study Goals

The process for the evaluation and selection of the Recommended Alternative is shown in Figure L-1. The project is currently in the "Approval of Final EIS" stage shown at the bottom of the third column in Figure L-1. This stage will be followed by the Issuance of a Record of Decision which concludes the National Environmental Policy Act (NEPA) process with the Recommended Alternative and approved by FHWA.

1.0 Modifications to the DEIS Build Alternative

Three modifications to the DEIS Build Alternative were developed as a design response to comments received on the DEIS. The comments indicated that a narrower cross-section was desired to reduce impacts on neighboring properties and minimize displacements to the extent practical. Comments also were received about the three lane service drives being too wide and encouraging high speeds.

More detailed descriptions of the three modifications to the DEIS Build Alternative described previously in Section 4.4 of this FEIS follow.

1.1 Modification 1

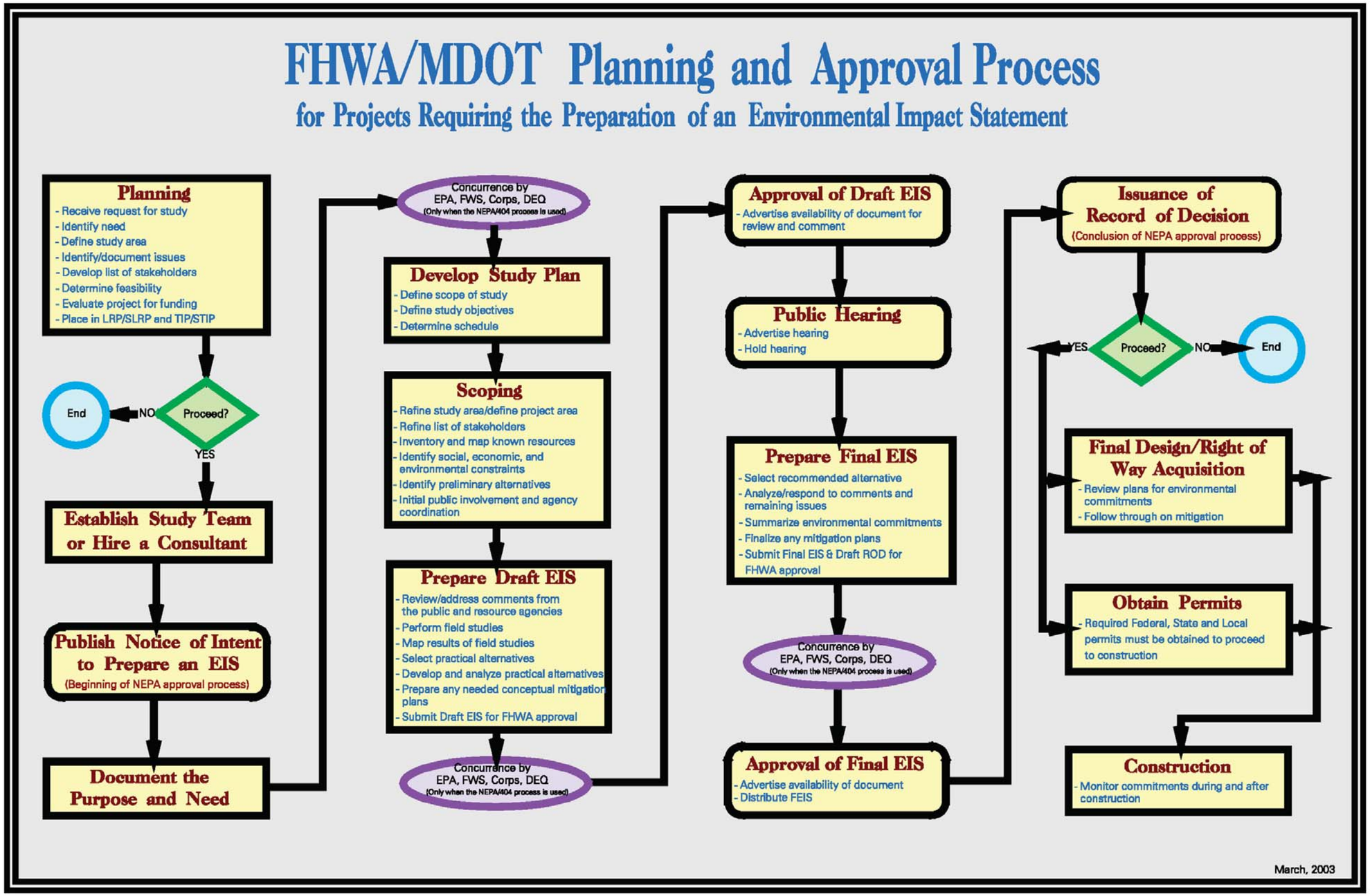
This modification of the DEIS Build Alternative retains all of the design features of the DEIS Build Alternative with two exceptions:

- Removal of the reserved space in the median for future transportation needs; and
- Narrowing of the service drives to two 11-foot traffic lanes.

The median will include two 12-foot shoulders and a six- to ten-foot variable space between the shoulders in which to locate the median barrier and the bridge piers. The median will vary from a minimum of six feet to as much as ten feet to accommodate bridge piers. The original median with the reserved space was a total of 54.5 feet. This represents a total reduction of 20.5 feet.

The narrower median has the advantage of allowing the pavement rehabilitation to remain on the existing I-94 roadway alignment. The combination of a narrow median and narrow service drives results in Modification 1 having the fewest displacements compared to the DEIS Build Alternative and other modifications considered. This design will eliminate the need to relocate the I-75 mainline pavement. Refer to Figure L-2.

Figure L- 1: Process for Evaluation and Selection of the Recommended Alternative



1.2 Modification 2

This modification of the DEIS Build Alternative retains all of the design features of the DEIS Build Alternative except that the service drives have two 11-foot traffic lanes. The narrower service drives require slightly less right-of-way and would, therefore, result in fewer displacements than the DEIS Build Alternative. By retaining the wider median with the reserved space, Modification 2 requires a shift in the I-94 centerline (like the DEIS Build Alternative) and a shift in the centerline of I-75 requiring up to a mile of I-75 pavement to be relocated to accommodate the interchange design. Refer to Figure L-3.

1.3 Modification 3

This modification of the DEIS Build Alternative retains all of the design features of the DEIS Build Alternative with one exception. That exception is the removal of the median with a reserved space for future transportation needs. As in Modification 1, the median includes two 12-foot shoulders and a 6- to 10-foot variable space between the shoulders in which to locate the median barrier. As in Modification 1, the narrower median allows rehabilitation to stay on the existing centerlines of I-94 and I-75 through the interchange with I-94, thus eliminating the need to relocate existing pavement. The narrower median also results in fewer displacements than the DEIS Build Alternative. The three-lane service drives are retained throughout the project, as included in the DEIS Build Alternative. Refer to Figure L-4.

2.0 Comparison of Practical Alternatives and Selection of the Recommended Alternative

The practical alternatives and modifications described above were compared by evaluating each of the three alternatives (No-Build, Enhanced No-Build, and the DEIS Build) and the three DEIS Build Alternative modifications relative to a series of factors grouped into the following categories:

- Engineering;
- Community access and circulation;
- Environment; and
- Social and economic.

The factors that influenced the decision regarding the selection of a recommended alternative were identified through an extensive public involvement process pursued throughout the development of this project, comments received on the DEIS document, and through discussions with the ICC and the MDOT.

The *Recommended Alternative Report* describes the factors in detail, the evaluation process for selecting the Recommended Alternative, and the results of the Recommended Alternative analysis, and is available upon request. A summary of the evaluation results is presented below.

Modification 1 with refinements (See FEIS Section 4.5) is the Recommended Alternative based on the following considerations:

Engineering. The Recommended Alternative:

- Provides increased capacity by adding an additional through-traffic lane in each direction.
- Corrects safety and operational problems by improving entrance and exit ramp configurations, provides auxiliary lanes to minimize conflict points, and provides a safe, modern design that meets the MDOT and American Association of State Highway and Transportation Officials (AASHTO) standards.
- Allows independent projects to be constructed separate from the mainline freeway. For instance, the Gratiot and Conner interchanges and adjacent service drives can be constructed independently of the I-94 construction. This will help maintain local traffic during the mainline construction.
- Addresses existing drainage problems by providing a new state-of-the-art drainage system with adequate capacity for 100-year-storm events for the existing and additional paved areas.
- Allows grade separation structures to be built, by following the existing centerline, before building mainline I-94. The grade separation structures would be used during and after I-94 reconstruction.
- Uses existing service drives. More than 60 percent of the proposed service drives currently exist east of I-75 and can be preserved in their present configuration.
- Corrects deficiencies at the I-75 and M-10 interchanges by eliminating left-hand exits and entrances as well as providing geometrics that meet current standards.
- Results in the lowest construction cost of the DEIS Build Alternative and modifications.
- Requires less right-of-way with fewer associated impacts than the DEIS Build Alternative and Modifications 2 and 3. This is due to the two-lane service drive and median without reserved space.
- Results in lower maintenance costs compared to the No-Build Alternative.

Community Access and Circulation. The Recommended Alternative:

- Provides continuous service drives throughout the project as an alternative to freeway travel for local trips.
- Provides east-west pedestrian movement that does not exist today adjacent to the I-94 corridor.
- Provides more flexibility than the DEIS Build Alternative and other modifications considered for placement of pedestrian crossings, thus improving neighborhood access. This is due to the narrower cross-section.
- Allows a safer sidewalk configuration than the No-Build Alternative, since sidewalks are proposed adjacent to the continuous service drives and on all reconstructed crossings over I-94.
- Improves pedestrian and vehicular access in the M-10 and I-75 interchange areas due to the continuation of the service drives through the interchange areas.

Environment. The Recommended Alternative:

- Based on the current level of design, results in the least number of buildings acquired (the maximum number of buildings within the right-of-way identified): The Recommended Alternative (Modification 1 Refined) acquires 42 buildings (18 residential, 24 commercial) compared to the DEIS Build Alternative with potentially 69 (42 residential, 27 commercial), Modification 2 with potentially 59 (33 residential, 26 commercial), and Modification 3 with potentially 46 (22 residential, 24 commercial).
- Allows for retaining wall design to reduce noise levels. Where warranted based on the FHWA and MDOT criteria, state-of-the-practice noise and retaining walls will be constructed in the corridor to improve neighborhood noise levels.
- Allows for improvement of water quality due to upgrading existing drainage system and the addition of pollution control measures where needed.
- Results in all predicted air quality pollutant concentrations to be below applicable federal and state standards. The project is not predicted to cause or exacerbate a violation of the CO standards. This is accomplished by reducing congestion and improving traffic operations by increasing capacity and using state-of-the-practice roadway design.

Social and Economic. The Recommended Alternative:

- Provides better local access by separating through traffic from local traffic. Local traffic now will have an alternative to getting on I-94 to travel a short distance east or west. The continuous service drives will collect local traffic, distribute local traffic, and enhance traffic circulation in and around the project area.
- Improves connections among I-94, I-75, I-96, and M-10. This addresses a major regional transportation plan objective to maintain truck mobility, as this segment is a hub of interstate-to-interstate and international truck travel.

The Recommended Alternative provides a modern design appropriate for a high-volume, urban interstate highway and benefits over the no-build alternatives. The no-build alternatives primarily address the physical condition of the roadway and not the other problems.

The Recommended Alternative will increase capacity to meet future transportation demands within the corridor, separate local traffic from through traffic, provide a modern design with superior operating characteristics, improve safety, and improve Pedestrian and bicycle mobility. The Recommended Alternative also is designed to incorporate aesthetic enhancements. It also will expand pedestrian sidewalk facilities, improve lighting, improve drainage systems, and increase the potential to include environmental mitigation as needed to address water, air, and noise pollution.

The continuous two-lane service drive will:

- Improve traffic circulation on surface streets, easing travel for residents and businesses; and
- Enhance the potential for transit service along the service drives by providing a continuous roadway for bus operation throughout the 6.7 miles of the project. There also will be opportunities for signal preemption, shelters, turn-outs, and other features to facilitate transit operations.

Figure L- 2: DEIS Build Modification 1 – Typical Section

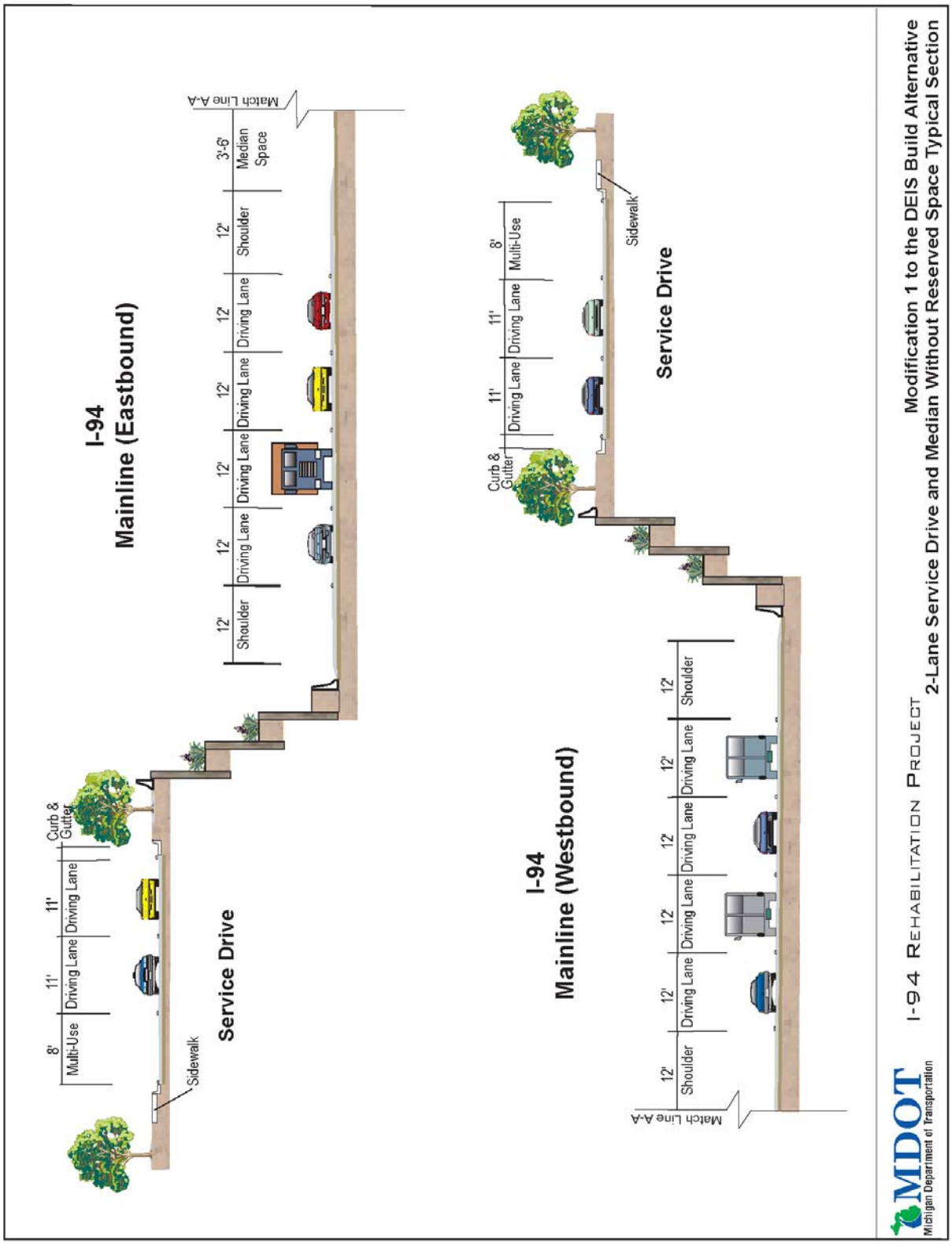


Figure L-3: DEIS Build Modification 2 – Typical Section

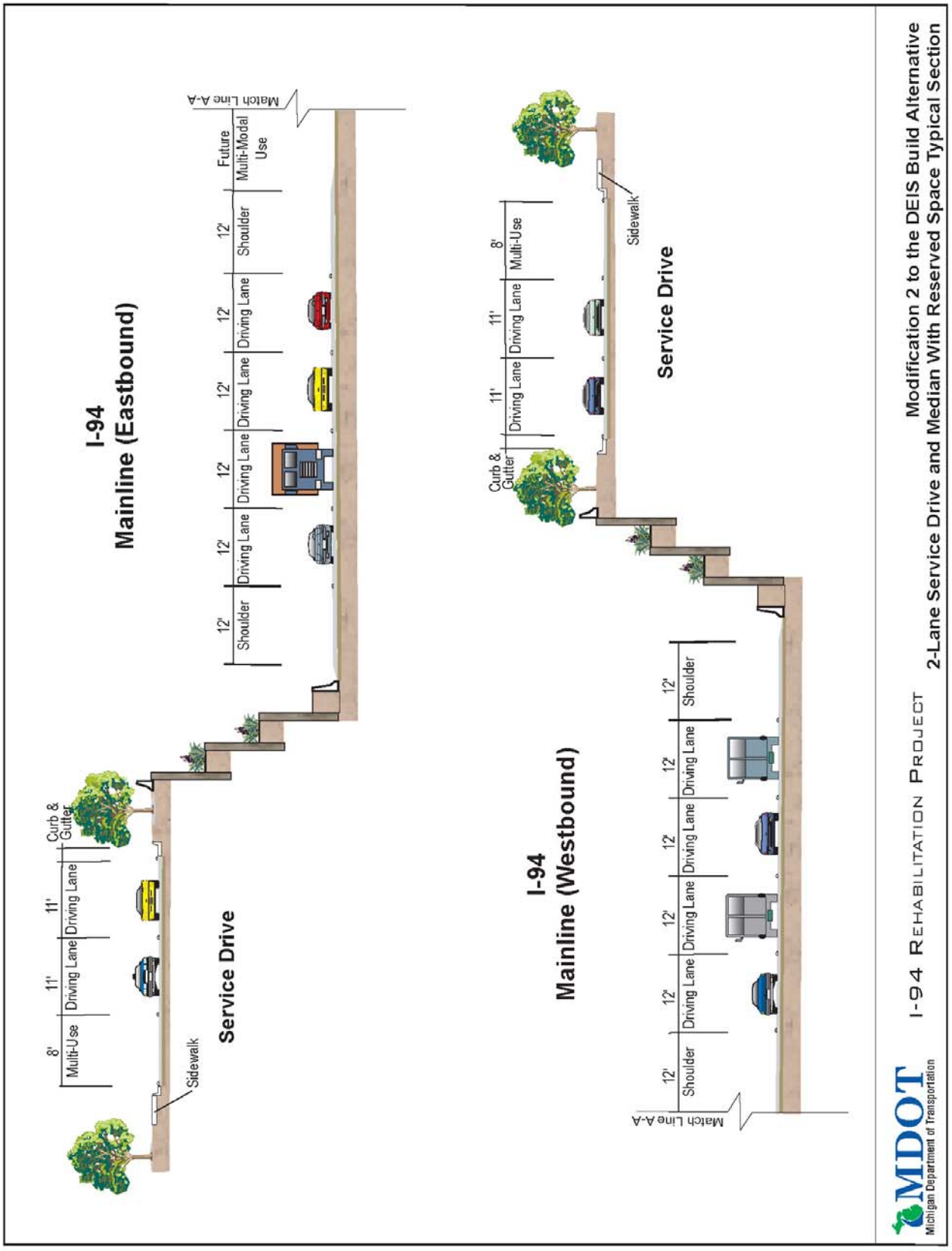
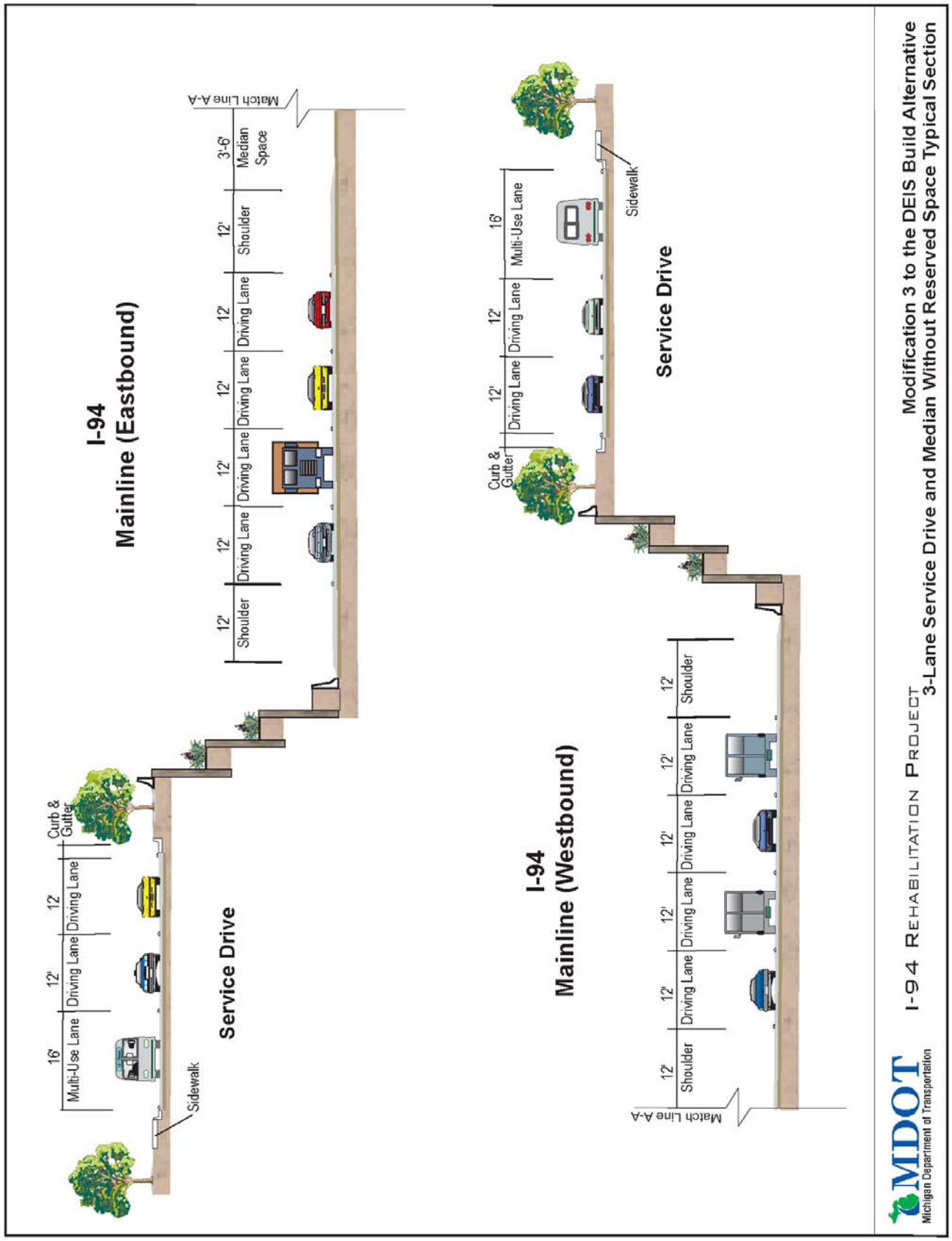


Figure L-4: DEIS Build Modification 3 – Typical Section



3.0 Refinements to the Recommended Alternative

Three refinements were made to the recommended alternative. A detailed description of these refinements follows:

3.1 Refinement 1: Wider Inside Shoulders

The first refinement is the addition of 2 feet to the width of the mainline I-94 inside 12-foot shoulders. The 14 feet would provide improved stopping-sight distance on horizontal curves and additional safety for motorists in accordance with the AASHTO shoulder criteria for high-volume freeways that have a large percentage of truck traffic. The 14-foot inside shoulders would be built with the same pavement design as the four through-traffic lanes so they can be used when needed for safety and for maintaining traffic during road repairs or traffic incidents. This will widen the median space an additional 2 feet on each side throughout the project, but will not change the right-of-way required for the project. The use of taller retaining walls will minimize additional impacts, so the additional 2 feet will not increase the number of impacts for the Recommended Alternative.

The 14-foot inside shoulders on I-94 would not be applied to the Dequindre Yard Bridge. The bridge was reconstructed in 2001 with 4-foot inside shoulders and designed to predominantly accommodate the widening on the north side of the I-94 freeway. The alignment and impacts are such that the widening is best to occur to the north of the existing Dequindre Yard Bridge. The Dequindre Yard Bridge qualifies as a long structure, and the 4-foot inside shoulders meet the minimum requirement for long structures. (Policy on Design Standards-Interstate System, AASHTO, 1991) Additional inside shoulder width on the Dequindre Yard Bridge will be considered when a major rehabilitation or replacement of this bridge is considered in the future. The Dequindre Yard Bridge will be widened on the outside as part of this project to provide for an additional through-traffic lane in each direction of the I-94 freeway mainline.

3.2 Refinement 2: A Third Service Drive Lane

The second refinement proposed for Modification 1 is the addition of a third eastbound service drive lane from M-10 to I-75 on the south side of I-94 to address traffic capacity needs. The 2020 and 2025 traffic analyses indicate that a two-lane service drive is adequate in most portions of the corridor, but a third lane is necessary along the eastbound portion of the service drive between M-10 and I-75 to meet future traffic demands (see Appendix A and traffic reports: *Traffic Report Volume 2, Simulation of Future Conditions,* and the 2025 traffic analysis, *Traffic Report Volume 3*). Wayne State University was pleased that a three-lane service drive along I-94 between M-10 and I-75 to facilitate traffic flow and parking lot demands was warranted.

There are no additional impacts for Modification 1 with a three-lane service drive on the south side of I-94 between M-10 and I-75, since there is sufficient right-of-way in this area. The limited addition of a third lane on the service drives puts additional capacity where it is needed and retains the reduced impacts of a two-lane service drive elsewhere.

3.3 Refinement 3: An 8-Foot Shoulder on the Service Drive

The third refinement proposed for Modification 1 is changing the 8-foot multi-use (parking) lane to an 8-foot shoulder on the service drive. The 8-foot shoulder meets AASHTO requirements, provides an area for stalled vehicles, and accommodates future bus options. In addition, it enables the service drives to match existing service drive cross-sections of 30-feet wide.

4.0 Potential Staging Options Associated with the Recommended Alternative

Since the Recommended Alternative leaves the existing service drives in place, it allows the option of staging construction through one or more smaller projects. This approach would help:

- Connect service drive segments; and
- Reconstruct the interchanges at Conner and Gratiot to current design standards.

The current discontinuity of service drives requires local traffic to use short segments of I-94 to bypass service drive gaps. If the service drives are connected as an early phase of construction, local traffic could stay on the service drives to move east and west along I-94 east of I-75 and not add to the congestion on the mainline. This would reduce local traffic demand on I-94 permanently and during construction.

The three projects could be constructed in advance of the main I-94 construction to achieve maximum benefit:

- The Conner project will rebuild the Conner interchange and build service drives from Conner to Springfield (see Figure L-5). The estimated cost is $9.1 million (2004 dollars).
- The Gratiot project will rebuild the Gratiot interchange and build service drives from Bewick to Rohns (see Figure L-6). The estimated cost is $9.1 million (2004 dollars).
- The Mt. Elliott structure will remain as is while service drives are built from existing Harper west to Mt. Elliott north of I-94 and from existing Harper east to Frontenac south of I-94 (see Figure L-7). The estimated cost is $3.3 million (2004 dollars).

These projects would be independently useful, since they provide simpler, safer interchanges and connect parts of the existing service drives to have continuous service drives from the Chene Avenue interchange to Conner Avenue. They will be beneficial even if the reconstruction of I-94 is delayed.

5.0 Design of the Recommended Alternative

This section identifies the design standards, policies, and procedures that apply to interstate Federal-aid projects. The control documents for the design of highways include *A Policy on Geometric Design of Highways and Streets, 2001,* by the AASHTO (AASHTO, Green Book) as the primary reference for geometric design standards as indicated in 23 CFR 625.4. The functional classification of the facility is the parameter that defines the specific design criteria to be applied. Design criteria and level of service vary according to the function of the highway facility. Interstates are functionally classified as Principal Arterials. Principal Arterials carry most of the trips entering and leaving urban areas in addition to trips between central business districts and outlying residential areas, between major inner-city communities, and between major suburban centers. In addition to the common functional classification, AASHTO further defines design criteria for freeways by urban and rural designations. These criteria, to some

degree, establish the design speed of the facility. The I-94 corridor is an urban freeway, and the design speed for the mainline is 60 miles per hour (mph). The *Recommended Alternative Report* provides specific numeric values for each criterion separated for mainline freeway, ramps, and service drives.

The importance of adhering to design criteria on the interstate system is magnified by the processing requirements and degree of scrutiny afforded design exceptions by the FHWA. For interstate projects, the FHWA has developed a list of 13 controlling criteria. The 13 controlling criteria must adhere to full interstate standards as contained in the 2001 AASHTO Green Book and are typically applied to the interstate mainline corridor. Approval of design exceptions to the controlling criteria are considered Level I design exceptions and must be formally submitted to the FHWA for concurrence.

The 13 controlling criteria are:

1. Design speed;
2. Lane width;
3. Shoulder width;
4. Bridge width;
5. Structural capacity;
6. Horizontal alignment;
7. Vertical alignment;
8. Grades;
9. Stopping sight distance;
10. Cross-slopes;
11. Superelevation;
12. Vertical clearance; and
13. Horizontal Clearance.

There are important design features other than those identified in the 13 controlling criteria which must be given careful consideration during the project development process. These include capacity, lane balance, weaving, acceleration-deceleration lengths, ramp and lane tapers, and other elements of sound design. In addition, safety features must conform to the *Roadside Design Guide* relative to clear-zones, side-slopes, ditches, roadway features, and barriers associated with medians, bridges, obstacles, etc. These features are not controlling criteria and do not require processing a formal design exception. Approval of design exceptions in this category are considered Level II exceptions and are typically justified and documented via the FHWA coordination meeting minutes and included in the *Interchange Access Justification Report*. Design exceptions will be required in this category as well and include criteria related to ramp spacing, exit and entrance ramp terminals, capacity, ramp horizontal sight distance, etc. The justifications for these design exceptions will be documented in the *Access Justification Report*.

6.0 Value Engineering

Value engineering is an independent study to review documents and design to see if there is a more prudent and economical way to accomplish the engineering design to-date. A value engineering study was conducted in March 2004 by the Michigan Department of Transportation. The goal was to verify the footprint of the Recommended Alternative to confirm that the right-

of-way identified for this FEIS was sufficient. The *Final Value Engineering Report, Early Preliminary Engineering (EPE) Study, I-94 Reconstruction from I-96 to Conner Avenue, Detroit, Michigan*, May 2004 states that the I-94 Rehabilitation Project was reviewed in detail and verified the engineering and costs for the Recommended Alternative. The final report states that Recommended Alternative is buildable within the footprint (right-of-way) proposed.

7.0 Evaluation of the Recommended Alternative in Relation to the Study Goals

The effectiveness of the Recommended Alternative in meeting the four goals and associated objectives established for this study is summarized below.

7.1 Goal 1, Mobility: Maintain and enhance safe and efficient transportation for passengers and freight on I-94 including the M-10 and I-75 interchanges.

The traffic analysis using forecasted 2025 SEMCOG model traffic volumes shows that, under the Recommended Alternative, the severe congestion occurring under the no-build alternatives would be reduced. Computer-based traffic models indicate that the DEIS Build Alternative and modifications, including the Recommended Alternative, best serve the project corridor and improve traffic operations. The results indicated that, during the AM and PM peak hours, the levels of service along the project corridor would be primarily Level of Service (LOS) E or better, as compared to the No-Build Alternative with LOS F.

Presently, the surface street network in this section of the city of Detroit lacks east-west connectivity, primarily due to the presence of the I-96, M-10, and I-75 freeways. The continuous service drives will provide a much-needed new east-west surface street connection through central Detroit. The Recommended Alternative will improve traffic operations along the surface street network. The analysis results show acceptable operations with virtually all intersections operating under capacity.

The Recommended Alternative provides a major improvement over the No-Build Alternative and Enhanced No-Build Alternative in the system's connectivity by:

- Providing a continuous eight-lane connection directly linking I-94 to I-96 and I-75; and
- Indirectly linking these facilities to the Ambassador Bridge and Detroit/Windsor Tunnel, as well as the Blue Water Bridge at Port Huron.

The I-94 Rehabilitation Project's Recommended Alternative eliminates bottlenecks, maintains connectivity, and reduces the severity and duration of congestion throughout the project corridor. It is the best option to address the needs of the corridor while addressing impacts and constraints. The Recommended Alternative meets the future traffic demand for the project and satisfies the traffic component of the purpose and need for this project.

7.2 Goal 2, Access and Development: Improve access and enhance economic development potential in the I-94 project area and adjacent areas.

The Recommended Alternative would provide improved access to residents and the business community by accomplishing the measures described in Section 4.7.2 of the DEIS.

Figure L-5: Modification 1 Staging Area: Conner Avenue

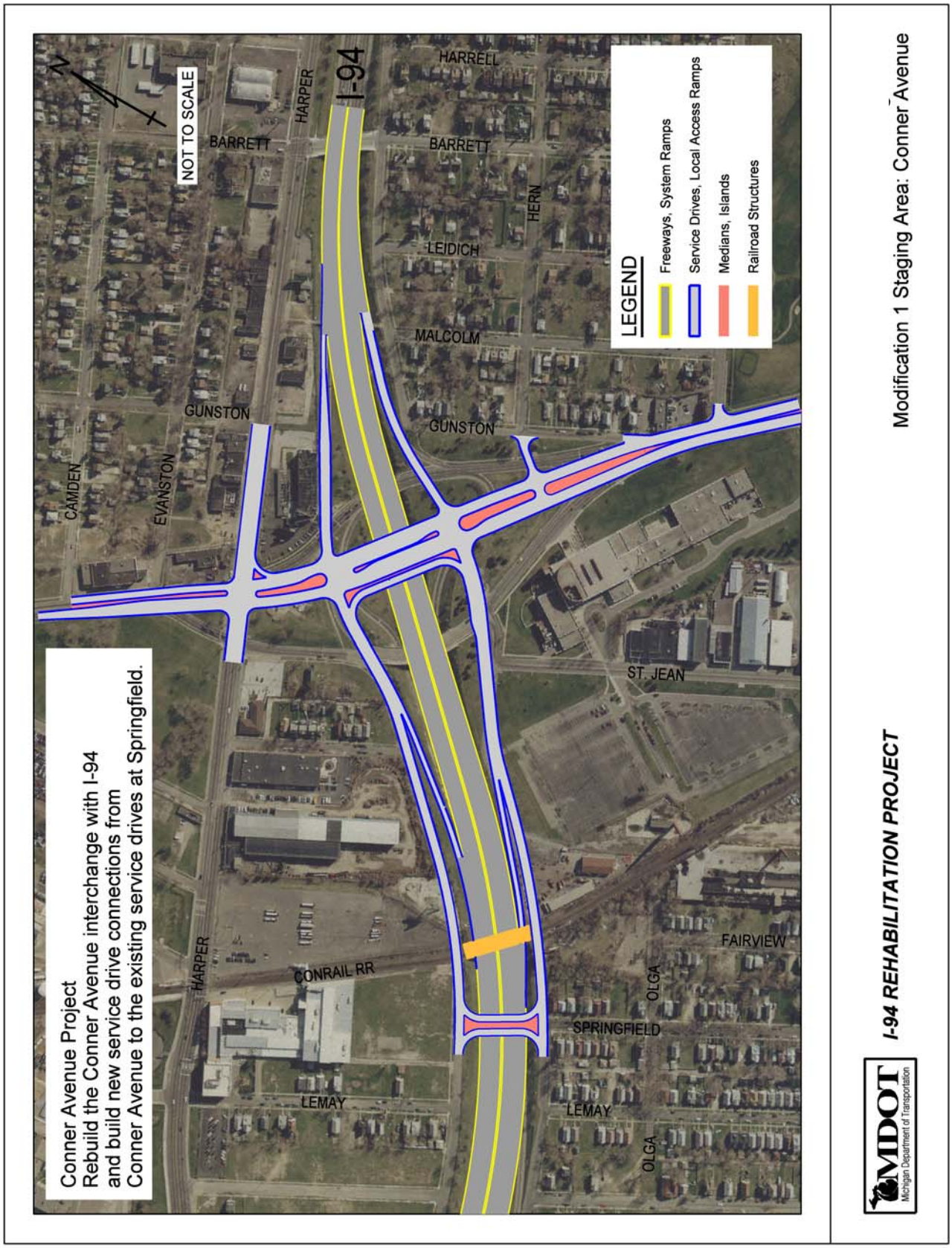


Figure L-6: Modification 1 Staging Area: Gratiot Avenue

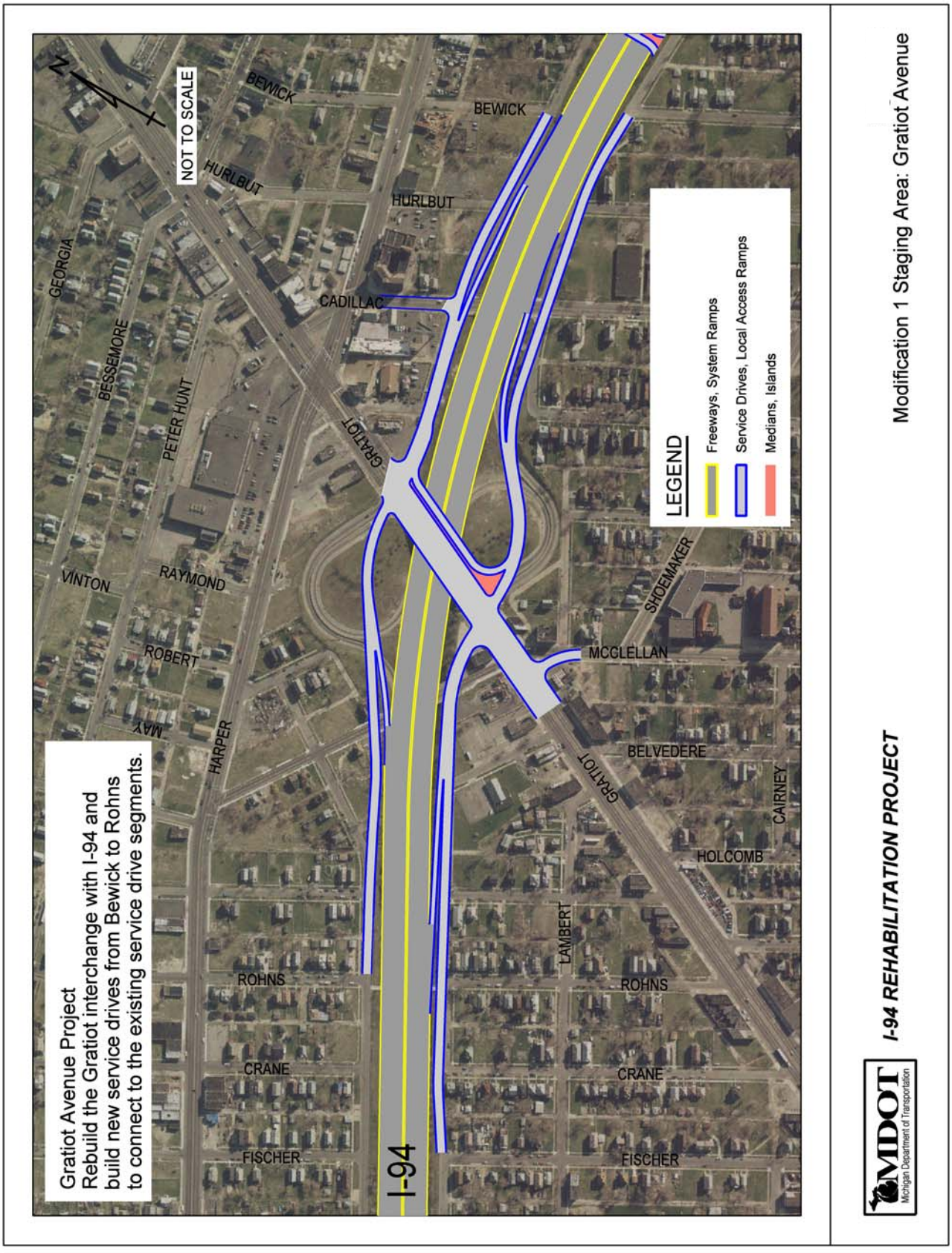
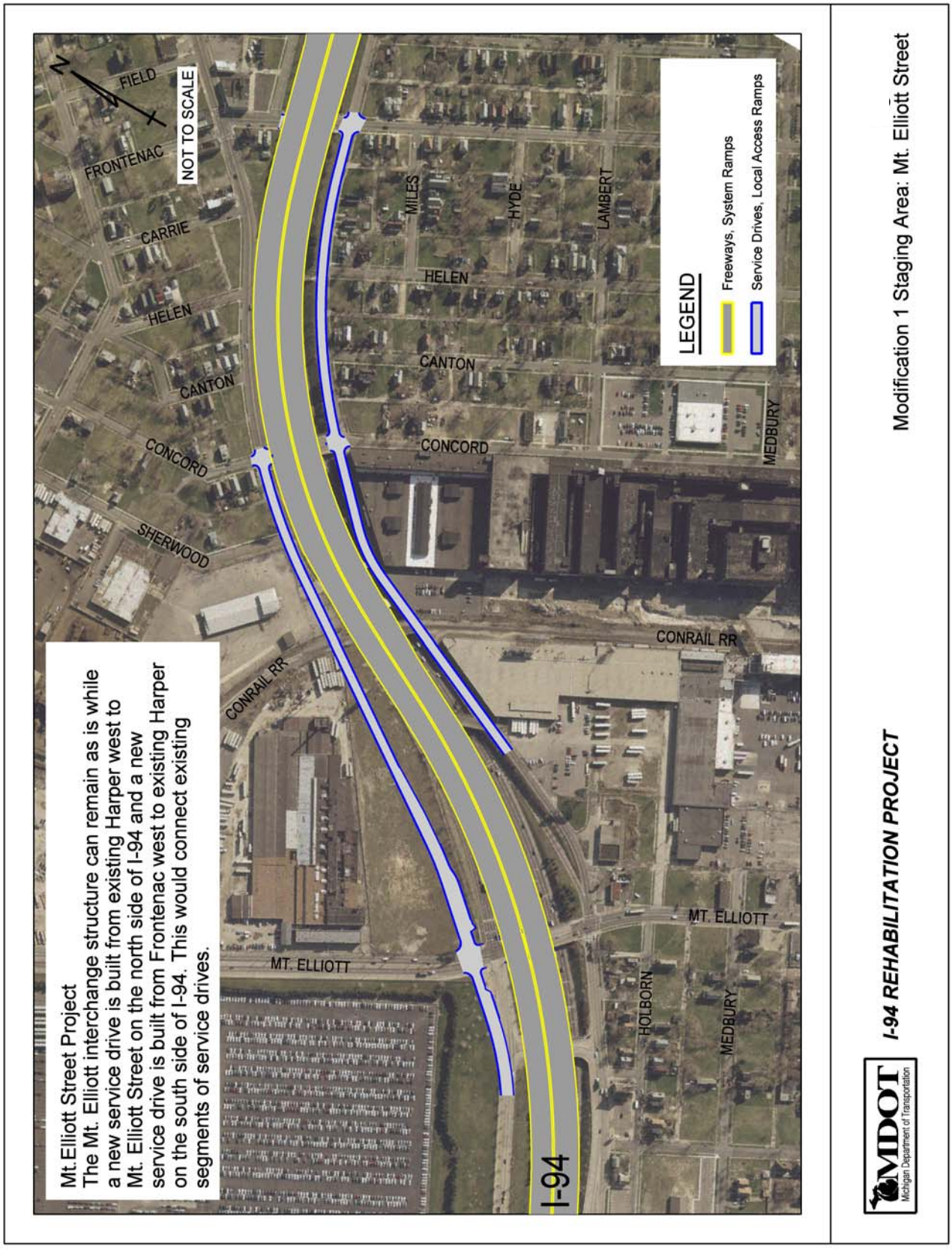


Figure L-7: Modification 1 Staging Area: Mt. Elliot Street



7.3 Goal 3, Environment: Maintain and enhance the beneficial social, economic, and environmental effects of the project while minimizing impacts.

The Recommended Alternative:

- Will require the least property acquisition compared to the DEIS Build Alternative and its other modifications.
- Will add money and jobs (resulting from construction of the project) to the local economy, with the least amount of impacts of the DEIS Build Alternative and its other modifications.
- Will construct noise barriers in the three locations that meet the state and federal requirement. See Section 5.6.6.4.
- Will control storm water runoff. The discharge to storm or combined sewers will be limited to pre-construction rates.
- Will include the recording of impacted cultural resources to SHPO standards before destruction. Also, other mitigation will be implemented as described in Section 6.
- Will provide planning for construction staging and operations. The planning will reduce impacts to the adjacent neighborhoods to the extent practicable.

7.4 Goal 4, Cost Effectiveness: Develop an efficient transportation system that maximizes return on limited resources, recognizing that benefits include enhancements to accessibility, community cohesion, job development potential, and service to transit users.

Cost estimates for implementation of the alternatives are shown in Table L-1. These estimates are based on concept design quantities and unit prices. The DEIS reported a No-Build Alternative cost of $16 million, which assumed that a pavement overlay (new pavement surface) project would extend the life of the facility. The No-Build Alternative cost of $24 million assumes only maintenance costs. There are currently no projects listed in the MDOT's 5 year Plan in the I-94 project area.

The Enhanced No-Build Alternative addresses condition only and does not address current traffic-related problems such as safety, traffic operations, or separation of local and through traffic. The Enhanced No-Build Alternative construction cost includes removal of the old roadway and structures and construction of bridge structures, ramps and pavement without major changes to the current configuration of I-94 and its interchanges with M-10 and I-75. Also included are miscellaneous items, traffic control, and mobilization. Excavation and design costs are also assumed.

The No-Build and Enhanced No-Build Alternatives do not address long-term capacity needs or contribute to the ongoing economic development, community cohesion, or job creation. As a result, the Recommended Alternative costs more; however, it addresses a variety of issues and benefits the immediate community, the city of Detroit, southeast Michigan, and the entire state. Chapter 5 has a more extensive discussion of the full range of benefits that are expected to result from implementation of the Recommended Alternative.

Table L-1: I-94 Rehabilitation Project Cost Estimates (In Millions, 2004 Dollars)

	No-Build Alternative	**Enhanced No-Build Alternative**	**Recommended Alternative**
Construction	$19	$715	$946
Right-of-Way	$0	$1	$50
Design and Construction Engineering	$5	$145	$185
Total	**$24M***	**$861M**	**$1,181M**

*No-Build Alternative assumes only maintenance costs