CHAPTER 12 • PREFERRED PROGRAM OF PROJECTS

12.1 System Alternatives

During the course of the Initiative several recommendations were adopted by the OKI Oversight Committee and the MVRPC Task Force, the following sections outline the final study recommendations of the committees. The following recommendations and the findings of the study were approved by the OKI Executive Board on October 9, 2003 and by the MVRPC Transportation Committee on September 4, 2003.

The following alternatives illustrate improvements that could be made before capacity is added to the interstate. They represent a program of system modifications to improve the overall flow of the interstate mainline and improvements to local roadways to encourage the use of parallel routes. In order for any interchange improvement to be completed, it must be determined through an Interchange Justification or Modification Study (IJS or IMS) that the project will not have a negative effect on the mainline of the interstate. These alternatives are designed to enhance the existing conditions of the interstate and are therefore, not expected to have a negative effect on the mainline. Although, they must all proceed through the IJS or IMS process before being implemented. The projects have been prioritized in the OKI region with one being the most the highest priority project. Also, projects were divided by geography in the OKI region as well with Kentucky and Ohio projects ranked independently. The projects in the MVRPC region were not prioritized and are therefore, in no particular order. Descriptions and additional information regarding each project may be found in Chapter 6 of this report.

OKI Region

Table 12A
System Alternatives

Kentucky Project Rankings

Project	Ranking
Buttermilk Pike Auxiliary Lane Extension	1
Kyles Lane Local Improvements	2
Mall Road Extension	3
Richwood Road Local Roadway Improvements	4

Ohio Project Rankings

Project	Ranking
I-74/75 Interchange; Hopple Street Interchange; Mitchell Interchange; Local improvements	1
Lockland & Lincoln Heights	2
SR 747 (N. of Union Center to SR 4)	3
Union Road and Greentree Road Improvements	4
Cincinnati-Dayton Road	5
Butler-Warren Co. Line Road	6
SR 741 Improvements	7
Spring Grove Ave & Central Parkway Access Management & Signal Priority	8
SR 4/Bypass 4 Improvements	9

MVRPC Region

Table 12B
System Alternatives

MVRPC Rankings

Project
Downtown Dayton Subcorridor Option 1, Phase 1
Stanley Avenue Improvements
SR 741 Improvements
North Dixie Highway Improvements
SR 202 Improvements
County Road 25A Improvements
Troy-Sidney Roadway Improvements

12.2 Corridor Capacity Analysis

While evaluating the corridor capacity alternatives for the Initiative, it was anticipated that 4-lane continuity would be sufficient for the corridor's future capacity needs. After completing the analysis it was determined that the Volume to Capacity (v/c) ratio in the corridor on average would continue to exceed 1.00 or Level of Service (LOS) F even after capacity was added to the mainline. Therefore a LOS D analysis was undertaken to determine the capacity needed to achieve a LOS D or E on the interstate mainline. This section explains the results of that study.

Level of Service D Capacity Analysis

Using information from previous travel demand model runs, including Average Daily Travel (ADT), per-lane capacity and number of lanes) a planning level study was completed to determine the approximate number of through lanes needed on the interstate mainline. Please note that the LOS D analysis was only undertaken in Hamilton, Butler, Warren, Miami and Montgomery counties; the existing condition in Northern Kentucky remains. The summary results are contained in the table below.

A concurrence meeting was held with representatives from ODOT districts and central offices. The following chart illustrates decisions made regarding the initial model run for the LOS D analysis.

Table 12C
LOS D Initial Model Run

** Shaded Areas denote the number of lanes that should be analyzed as combination alternatives targeting a LOS D or E*

	3/4-Lane Continuity		4/5-Lane Continuity		5/6-Lane Continuity	
Segment	***V/C***	***LOS***	***V/C***	***LOS***	***V/C***	***LOS***
Freeman to I-74	1.26	F	1.01	f	0.84	d
I-74 to R. Reagan	1.14	F	0.91	e	0.76	d
R. Reagan to I-275	1.14	F	0.91	e	0.76	d
I-275 to I-675	0.97	E	0.78	d	0.65	c
▪ I-275 to Union Center						6 Lanes
▪ Union Center to SR 63				5 Lanes		
▪ SR 63 to I-675		4 Lanes				
I-675 to Springboro	0.74	c	0.59	c	0.49	b
Springboro to Needmore	0.92	e	0.73	c	0.61	c
Needmore to Northwoods	0.88	d	0.70	c	0.58	c
Northwoods to Shelby Co. Line	0.78	d	0.59	c	0.47	b

Notes:
1) Each segment V/C ratio is an average of the northbound and southbound lanes
2) Level of service is calculated from the 2000 Highway Capacity Manual for freeways with 70 mph design speeds.
3) Generally the 4-Lane Continuity includes Hamilton, Butler, Warren and Montgomery Counties (excluding the Dayton Subcorridor) through the Northwoods' Exit; the 3-Lane Continuity includes Miami County through the Piqua Exist (No. 83).

Within Montgomery County, the Downtown Dayton Subcorridor consists of 3 continuous lanes from Edwin C. Moses through SR 4 and 2 auxiliary lanes as needed.

Initial Model Run Results

The results of the travel demand model confirmed that most of the corridor achieved a LOS D or E with the addition of mainline through lanes. In isolated areas a LOS F is still observed on the mainline. In these instances, the addition of an auxiliary lane is more than likely needed to mitigate the effects of deficient interchange spacing and future traffic volumes. In Hamilton, Butler & Warren Counties, the LOS D Alternative resulted in a 19% decrease in the V/C ratio and a 4% increase in daily traffic from the 3/4 Lane Continuity Alternative, on average. In all of Montgomery and Miami Counties the number of lanes remained consistent with the 3/4 Lane Continuity alternative and therefore the results of both have little variation. The following chart illustrates the comparison between the LOS D/E Alternative and the 3/4 Lane Continuity Alternative for the regions on average.

Table 12D
LOS D/E Alternative and the 3/4 Lane Continuity Alternative Comparison

Region	**3/4 Lane Continuity Alternative**		**LOS D/E Alternative**	
	ADT	***V/C***	***ADT***	***V/C***
OKI *(Hamilton, Butler & Warren Counties)*	181,248	1.15	188,699	.93
MVRPC *(Montgomery & Miami Counties)*	125,222	.88	125,087	.87

Segment	**3/4-Lane Continuity**			**LOS D/E Alternative**		
	# of Lanes	***V/C***	***LOS***	***# of Lanes***	***V/C***	***LOS***
Freeman to I-74	4	1.26	f	6	0.91	e
I-74 to R. Reagan	4	1.14	f	**5**	**1.01**	**f**
R. Reagan to I-275	4	1.14	f	5	0.99	e
I-275 to I-675		0.97	e			
▪ I-275 to Union Center	4			6	0.86	d
▪ Union Center to SR 63	4			5	0.86	d
▪ SR 63 to I-675	4			4	0.90	d
I-675 to Springboro	4	0.74	c	4	0.80	d
Springboro to Needmore	¾	0.92	e	3/4	0.95	e
Needmore to Northwoods	4	0.88	d	4	0.91	e
Northwoods to Shelby Co. Line	3	0.78	d	3	0.80	d

Notes: 1) Each Segment V/C ratio is an average of the Northbound and Southbound Lanes
2) Level of Service is calculated from the 2000 Highway Capacity Manual for freeways with 70 mph design speeds.
3) An auxiliary Lane from on I-675 from SR-725 to I-75 was also added in Montgomery County

The concept for the LOSD/E analysis were presented to the OKI Oversight Committee and MCVRPC Task Force.

- On July 24, 2003 the MVRPC Task Force recommended the final program of projects, including the addition of lanes were warranted, be forwarded to the MVRPC Transportation Committee (TC) for review and approval.
- Similarly, the results of the LOS D/E analysis were presented to the OKI Oversight Committee on September 8, 2003. It was decided by the committee that more analysis was needed. The committee was concerned about the amount of right of way needed and the disruption to communities if there were five/six through interstate lanes. The OKI Oversight Committee asked that a new analysis be undertaken; a scenario with Lane Continuity alternatives, high frequency transit (less than 5 minute headways) and a

scenario with a peak period truck traffic restriction. As the current travel demand model technology is unable to analyze transit with headways less than 10 minutes, a risk analysis procedure was undertaken. The results of this additional analysis are presented below.

Additional Analysis Findings

Based on a request from the Oversight Committee, the consultant team conducted a comparative analysis consisting of the assessment of five alternatives to reach an effective and efficient build alternative.

1. Five-Lane Continuity
2. Four-Lane Continuity with Auxiliary Lanes and High Frequency Transit
3. Four-Lane Continuity with High Frequency Transit
4. Five-Lane Continuity with High Frequency Transit
5. Peak Period Truck Restriction (PPTR) with High Frequency Transit

The LOS estimates for all segments under study for the new alternative scenarios were estimated for a 30-year period. The Five-Lane Continuity with High-Frequency LRT alternative is estimated to have a LOS C at the early years and a LOS D/E for almost all segments throughout the project cycle. The Four-Lane Continuity with Auxiliary Lanes at Major Intersections and High-Frequency LRT alternative would also generate LOS C and D in the first 15 years after the construction, and LOS D and E in the later years. In the later years of the project, the level of service for the PPTR with High-Frequency LRT alternative is around LOS F for most of the segments under study, which is lower than what ODOT requires.

The impact of LRT service on highway congestion along I-75 can be described in terms of delay –the number of years before congestion levels reach what they would have been without transit. Building an LRT system according to the base service criterion will buy the highway transportation system approximately 10 years delay in congestion levels. By increasing the transit to a very high service level (3 minute headways/ $1.00 fare/ 30mph door-to-door speed), transit holds the possibility of delaying congestion levels for up to 20 years in the corridor.

The PPTR with High-Frequency LRT alternative is the highest-ranking strategy in terms of net contribution (Net Present Value, NPV) to the economic welfare of the region. However, since the estimated LOS is F, it is not considered to be a viable alternative. Total travel time savings for this alternative are also lower than some other highway build options. Implementation of this alternative has complications, as it constitutes restrictions on trucks during rush-hour periods. This alternative will require additional resources for enforcement of the restriction on truck traffic at certain hours of the day and will disrupt freight transportation.

By comparison, the Four-Lane Continuity with Additional Lanes at Major Intersections and LRT alternative is estimated to create the second largest NPV. Economic benefits exceed the costs of constructing and operating the system (over 30 years) by more than $860 million. This alternative yields $1.42 in economic value for each $1.00 of capital and labor resources consumed in the construction and roadway maintenance process.

The Four-Lane Continuity with High-Frequency LRT alternative has the third largest NPV, $851.5million. The Five-Lane Continuity with High-Frequency LRT alternative has the highest estimated total benefits, about $3 billion. The total project costs for this alternative, however, are also the highest among the alternatives studied. The NPV for this alternative is about $834.1 million.

The Four-Lane Continuity with Additional Lanes at Major Intersections and High-Frequency LRT alternative has the highest Internal Rate of Return (IRR), 10.7%. Modified Internal Rate of Return (MIRR) is also the highest among highway build alternatives with high-frequency LRT. The estimated first year rate of return for this alternative, however, is the lowest

among all new alternatives considered. The Five-Lane Continuity with High-Frequency LRT alternative has the third largest rate of return figures. The Four-Lane Continuity with High-Frequency LRT alternative has a high first year return, but IRR and MIRR are lower than some other alternatives.

The table below summarizes the estimated total benefits, total costs, net present values, IRR, MIRR, first year rate of return and average LOS, for the year 2030, for all new alternatives.

Table 12E
Summary Comparison of Alternatives

Alternative	LOS	Total Travel Time Savings	Total Benefits	Total Project Costs	Net Present Value	Internal Rate of Return	Modified Internal Rate of Return	First Year Rate of Return
Five-Lane Continuity	E	$1,167.1	$1,255.3	$1,055.4	$199.9	4.9%	2.1%	5.6%
Four-Lane Continuity with Additional Lanes at Major Intersections and High-Frequency LRT	**D**	**$1,981.8**	**$2,910.7**	**$2,043.5**	**$867.1**	**10.7%**	**5.1%**	**4.4%**
Four-Lane Continuity with High-Frequency LRT	E	$1,635.2	$2,603.9	$1,752.5	$851.5	6.9%	4.0%	4.9%
Five-Lane Continuity with High-Frequency LRT	D	$2,109.6	$3,051.0	$2,216.9	$834.1	9.6%	4.5%	4.6%
Peak Period Truck Restriction with High-Frequency LRT	F	$1,624.0	$2,439.2	$1,208.4	$1,238.5	9.4%	5.6%	7.0%

Selected decision factors indicate that the Four-Lane Continuity with Additional Lanes at Major Intersections and High-Frequency LRT alternative is the best option among the new alternatives considered. This alternative has a LOS D with higher NPV, IRR, and MIRR than Five-Lane Continuity with High-Frequency LRT alternative. This alternative is the only other option that meets the level of service requirement. Total benefits for these two alternatives are also comparable.

Final Recommendations

Additional analysis of the corridor capacity alternatives beyond the level of service D analysis was not required in the MVRPC region. On July 24, 2003, The MVRPC Task Force recommended the final program of projects. On September 4, 2003, The MVRPC Transportation Committee recommended the final program of projects including the corridor capacity alternatives. The Transportation Committee's resolution is attached.

The OKI Oversight Committee voted to recommend 4-Lane Continuity with Auxiliary Lanes and High Frequency Light Rail Transit as the preferred corridor capacity alternative on September 29, 2003. This recommendation was accepted by the Ohio Kentucky Indiana Regional Council of Governments Board on October 9, 2003. The Board's resolution is attached.

12.3 Access Modification Alternatives

The evaluation of access points on the interstate mainline is the final component of the Initiative. As with the System Modification Alternatives, the Access Modification Alternatives must also progress to an IJS or IMS to determine the projects effects on the interstate mainline. These alternatives must also be balanced with the overall Corridor Capacity Alternatives are indeed the overall recommendations of the Initiative. The Access Modification Alternatives are prioritized in the OKI region in much the same way as the System Modifications. The alternatives are not prioritized in the MVRPC region and are therefore, in no particular order. The alternatives in both regions are, although, divided into three separate categories as follows:

- **Category I Project** – A high priority project that will be completed in 0 to15 years.
- **Category II Project** – A medium priority project that will be completed in 15 to 25 years.
- **Category III Project** – A low priority project that will be completed beyond a 25 year threshold.

OKI Region

Table 12F
Category I - Access Modification Alternatives (OKI)

Kentucky Project Rankings

Project	Ranking
Buttermilk Pike Auxiliary Lane Extension	1
Kyles Lane Local Improvements	2

Ohio Project Rankings

Project	Ranking
Norwood Lateral Interchange	1
Towne Street Interchange	2
Paddock Road Interchange	3
SR 122 Interchange	4
Tylersville Road Interchange	5

Table 12G
Category II - Access Modification Alternatives (OKI)

Kentucky Project Rankings

Project	Ranking
Burlington Pike Interchange	1
US 42 Interchange	2
Donaldson Road Interchange – Erlanger	3
C/D System from KY 18 to US 42	4

Ohio Project Rankings

Project	Ranking
Sharon Road Interchange	1
I-275 Interchange	2
Western Hills Viaduct	3
US 42 Improvements	4
SR 73 Interchange Improvements	5
SR 4 Improvements (Hamilton County)	6
SR 123 Interchange Improvements	7

Table 12H
Category III - Access Modification Alternatives (OKI)

Kentucky Project Rankings

Project	Ranking
I-71/I-75 Interchange	1
Turfway Road Interchange	2
C/D System from I-275 to Mt. Zion Road	3

Ohio Project Rankings

Project	Ranking
Downtown Cincinnati Access	1
Glendale-Milford Interchange	2
Third Street Ramp to I-75 Northbound	3
Ronald Regan Cross County Highway Interchange	4
SR 747 Glendale	5

MVRPC Region

Table 12I
Category I - Access Modification Alternatives (MVRPC)

Project
South Dixie / Central Avenue Interchange
Needmore Road Interchange
Edwin C. Moses Blvd. Improvements (Special Event Traffic Only)
SR 571 Interchange
SR 55 Interchange
CR 25A Interchange (Exit 78)
US 36 / CR25A Interchange (Exit 84)
Austin Road Interchange*

**The Ausitn Road Interchange Project was analyzed furing a separate study, but is being included in the project prioritization for the Initiative.*

Table 12J
Category II - Access Modification Alternatives (MVRPC)

Project
US 40 / Northwoods Blvd. Interchange
SR 725 Interchange
Wagner Ford Interchange
SR 41 Interchange
CR 25A Interchange (Exit 69)

Table 12K
Category III - Access Modification Alternatives (MVRPC)

Project
I-675 Interchange
Moraine-Kettering Access
Edwin C. Moses Blvd. (Full Interchange Upgrade)