5. Transportation System Needs

This chapter details Louisiana's 30 year state transportation system needs and provides a basis for understanding the possible funding gap between needs, improvements, and potential revenues (detailed in **Chapter 6**). The needs assessment reflects needs that exist today, as well as those that will accrue over the timeframe of the Plan. The assessment used a combination of forecasts, discussions with managers and modal experts, and extrapolations of current needs to produce an estimate of future needs. To the extent possible, the needs estimate for each mode was broken down into additional categories, such as:

- Preservation needs, to keep the existing and future system safe and in a state of good repair
- Modernization needs, to bring the existing system to current standards of safety and reliability
- Mobility and Capacity needs, for expansion of the existing system
- Operations needs, to improve system efficiency
- Backlog (existing) needs
- Accruing (future) needs

The needs assessment focused primarily on transportation facilities that are the responsibility of the state. However, additional needs are also identified where DOTD plays a supporting role. Further, the assessment focused on needs for which the state is willing to fund. DOTD's role is defined in terms of both decision-making and funding responsibility according to the following:

- **Owner-Operator**: DOTD is responsible for maintaining, operating, and enhancing infrastructure to achieve the goals and related objectives;
- **Partner**: DOTD will partner with others and will share a role in funding and decision-making to achieve the goals and related objectives; and
- **Participant**: DOTD will support public and private transportation delivery entities by providing policy support, guidelines, and/or complementary and opportunistic funding to advance the goals and objectives of the Plan.

DOTD is the owner and operator of the State Highway System and its planning and operations activities are structured around this responsibility. The Department also fulfills a partner role with local agencies relative to locally maintained roads (**Table 5-1**). For all other modes the Department is also a partner, sometimes a financial partner with state funding (example: the Port Priority Program and Airport Priority Program), sometimes an administrative partner in carrying out federal programs (example: transit), and at other times, a participant in coordinating and planning (example: freight rail). DOTD's Office of Multimodal Planning's Public Transportation, Marine and Rail, Ports and Aviation Sections provide most of DOTD's partnership and participant support in these areas. DOTD has a strong relationship with the State's Metropolitan Planning Organizations (MPOs) as well as with parishes and municipalities.

Table 5-1: DOTD Primary Roles by Mode

Component	Owner-Operator	Partner	Participant
State Highways and Bridges	✓		
Local Highways and Bridges		✓	
Trucking		✓	
Ports and Waterways		✓	
Freight Rail			✓
Aviation		✓	
Transit		✓	
Passenger Rail		✓	
Pedestrian and Bicycle		✓	

According to the Plan team's analysis, DOTD, in its role as owner-operator of the state multimodal transportation system, requires $55.9 billion (in 2010 dollars) in funding over the next 30 years to meet current and future needs.

Revenues that can fund the state system's transportation investment needs include fuel taxes, sales taxes and licensing fees, as well as other sources (described further in **Chapter 6**). The available funding from all such sources is $18.5 billion (in 2010 dollars) over the next 30 years. This means that the Department, without reassessing needs or allocating additional funding to these transportation programs, faces a potential shortfall of $37.4 billion to meet long-term transportation needs.

5.1 Definition of Needs

The Plan team defined needs as the investment levels required to accomplish defined transportation objectives. DOTD estimates highway preservation (asset management and maintenance) needs according to the goals, objectives, and performance targets institutionalized in its Strategic Management Plan using investment models; thus, the Department has defined quantitative targets and has estimated the investment levels needed to meet them for capital programming, as well as for this long-range plan. However, targets do not exist for all needs of interest to stakeholders, and forecasting tools are limited in their ability to produce all of the information necessary to produce reliable long-range needs forecasts. Thus, the team used a combination of data- and map-based analyses, coordination with DOTD advisory councils, an analysis of historic trends, DOTD engineering analyses, as well as policy analysis, to generate needs estimates capable of achieving the Plan's goals and objectives.

5.2 Types of Needs

The Plan team distinguished between different types of needs. These needs address different goal areas and most often are funded from different DOTD programs:

- ***Preservation and Maintenance***: Maintaining existing and future infrastructure according to DOTD objectives and goals. Preservation and maintenance includes replacing and rehabilitating physical assets. It also includes routine activities such as spot pavement repair, lane striping, bridge painting, etc. DOTD has developed a substantial set of performance targets for its asset management and maintenance activities, and these targets correlate directly with the needs estimates.

- ***Operations***: Activities to operate the system and improve traffic flow without adding capacity. This includes deploying intelligent transportation systems (ITS) technologies, which provide information to travelers and which use technology to manage traffic flow. Operations also include activities related to everyday activities for traffic control, rest areas, weigh stations, interstate lighting, etc.
- ***Safety***: Improving safety is integral to all roadway projects, and the Department considers how to maximize safety during the planning, design and engineering phases of any transportation investment. Examples of projects that fall within this category are expansion projects that address specific safety concerns, modernization projects that reduce or eliminate sharp curves, various improvements to address or eliminate rail at-grade crossings, and improving navigation aids on inland waterways.
- ***Expansion****:* Describes investments that add capacity to the transportation system through creating new services and infrastructure. Adding general purpose lanes, HOV lanes, toll lanes, and new airport runways or runway extensions are examples of expansion.
- ***Modernization***: Includes investments that bring the outdated elements of the transportation system up to current standards. Rebuilding interchanges, widening shoulders and reconfiguring land use access in major corridors are examples of these types of investments.
- ***Rural and Interregional Public Transportation Expansion***: This includes investments and grants in rural and small urban local and regional transit, and interregional transit services.

5.3 Primary Sources

To generate the needs estimates, the Plan team relied on a combination of readily available information, travel modeling, the team's analysis of quantitative data and extensive consultation with DOTD and the advisory councils. In particular, the Plan team reviewed the DOTD's estimates of current needs, documented in the *Now Needs* report.

Other sources of information were:

- For ***highway preservation, modernization and maintenance*****,** the Plan team prepared long-range forecasts of bridge and pavement needs using detailed and sophisticated asset management tools designed to prolong the life of infrastructure while minimizing lifetime costs. Needs for other infrastructure elements such as guardrail, were estimated by using standard replacement cycles and unit costs. The team combined these forecasts with the Department's annual estimates of backlog (existing) needs.
- For ***mobility and congestion****,* the team used DOTD analyses of existing needs, combined with an application of the FHWA Highway Economic Requirements Model (state version, HERS-ST). HERS-ST produces system-level forecasts of capacity needs based on comparisons of benefits to users of the state highway, compared to costs. HERS-ST identifies future congested roadway segments and compares the costs of various improvements to the benefits to highway users. HERS-ST inventories all cost-beneficial investments to produce a system-wide estimate of needs. The Louisiana statewide travel demand model, which forecasts future travel conditions and traffic volumes, is a second source of information from which needs were reviewed and validated.
- For ***operations, motorist services and safety*****,** the team reviewed the DOTD's existing needs estimates, current program distributions, likely replacement cycles and unit costs to produce an estimate of current and future needs.

- For ***bicycle and pedestrian preservation and expansion needs*****,** the team reviewed the current system and worked with DOTD to establish financially sustainable growth levels, using unit costs.
- For ***ports and waterways needs***, the team reviewed current asset conditions, reviewed recent planning documents and consulted with the Ports Association of Louisiana to understand current and future needs.
- For ***rail and aviation needs,*** the team incorporated the needs estimates for the modal plans that were being developed at the same time as this multimodal plan.
- For ***public transportation preservation***, the Plan team reviewed MPO plans and worked with DOTD's transit section to understand the current age and condition of the providers' bus fleets and to estimate needs based on current replacement cycles and growing needs. "Maintain current conditions" includes investments needed to upgrade equipment to current standards. Preservation for urban public transportation systems is not within DOTD's purview. However, the Plan documents needs for urban, rural and small urban transit, and some intercity transit.
- For ***public transportation expansion***, the Plan team reviewed current MPO plans and consulted with DOTD staff to understand future needs based on project population growth and growth in transit-dependent populations.

5.3.1 Pavement Needs

The Department's pavement performance objectives are:

- IHS at 97 percent fair or better
- NHS at 95 percent fair or better
- SHS at 90 percent fair or better
- RHS at 70 percent fair or better

DOTD describes the many types of pavement actions it takes to maintain roads and prolong their useful lives as follows:

- **Structural** describes repairs and rehabilitation due to a fault in the structural integrity of the roadway. The work usually entails removing earth down to the road base that produces a long-term solution.
- **Preservation** is an overlay of pavement on a scheduled interval that addresses faults such as cracking, potholes and rutting due to normal wear and tear.
- **Preventive maintenance** describes short-term fixes which protect and recover the functional condition of the road, leading to extended service life, but that do not address structural deficiencies.

Table 5-2 presents the projected costs of pavement improvements to achieve performance objectives over the 30-year plan horizon by system element. The 30-year needs estimate amounts to $18.2 billion. The statewide and regional systems, while accounting for 82 percent of total state system miles, are projected to require $12.2 billion in improvements, which is 67 percent of the pavement needs estimate. Interstates account for 16 percent of the total pavement needs, despite accounting for only 5.6 percent of the network mileage. The IHS, however, accommodates over one-third of all vehicle miles of travel in Louisiana.

Table 5-2: Pavement Needs by Roadway System (in millions of 2010 dollars)

Type of Improvement	IHS	NHS	SHS	RHS	Total
Structural	$638.41	$380.37	$264.08	$184.36	$1,467.22
Preservation	$2,233.86	$2,747.22	$4,671.23	$3,376.86	$13,029.17
Preventive Maintenance	$1.60	$7.06	$1,374.17	$2,280.13	$3,662.97
Total	**$2,873.81**	**$3,134.61**	**$6,309.55**	**$5,841.28**	**$18,159.25**
Percent of Total	16%	17%	35%	32%	100%

Source: DOTD

The IHS and NHS require more preservation actions and structural improvements because of the high volumes they carry and the overall benefit of these improvements over the long-term. Resurfacing and preventive maintenance are viable and cost effective sustainability strategies for the SHS. For the RHS, preservation and preventive maintenance are the best mix of actions to optimize roadway performance.

Table 5-3 presents the breakdown of pavement centerline miles by improvement type across DOTD systems over 30 years[8]. The statewide and regional systems account for 79 percent of centerline miles improved (67,893 miles). The IHS accounts for 7.5 percent of the total pavement needs at 6,436 total centerline miles of improvements, and the NHS has 11,603 centerline miles of pavement needs, or 13.5 percent of the total.

Table 5-3: Miles of Pavement Improvements, Directional Total through 2044

Type of Improvement	IHS	NHS	SHS	RHS	Total
Structural	2,411.0	2,322.2	1,386.5	890.0	7,009.7
Preservation	3,995.3	9,187.6	15,619.9	11,267.4	40,070.2
Preventive Maintenance	30.1	93.3	15,280.0	23,449.4	38,852.9
Total	**6,436.4**	**11,603.2**	**32,286.4**	**35,606.8**	**85,932.8**
Percent of Total	7.5%	13.5%	37.6%	41.4%	100.0%

Source: DOTD

As shown in **Table 5-4**, there is an estimated backlog of $3.7 billion in needed pavement improvements, which corresponds to 20 percent of total pavement needs.

Table 5-4: Pavement Needs, Existing and Future (in millions of 2010 dollars)

	Backlog	Accruing	Total
Amount	$3,706.90	$14,452.46	$18,159.36
Percentage of Total	20%	80%	100%

Source: DOTD

The performance outcomes from this analysis are described below and shown in **Figure 5-1**.

Interstate Pavement Conditions. The final year estimates project that 51.4 percent of the pavement would be in very good condition, 17.3 percent in good condition, and 31.3 percent in fair condition. A 7 or 8 year cyclical pattern for resurfacing needs would be required because these high traffic roadways deteriorate and are in need of regular improvement to maintain acceptable standards.

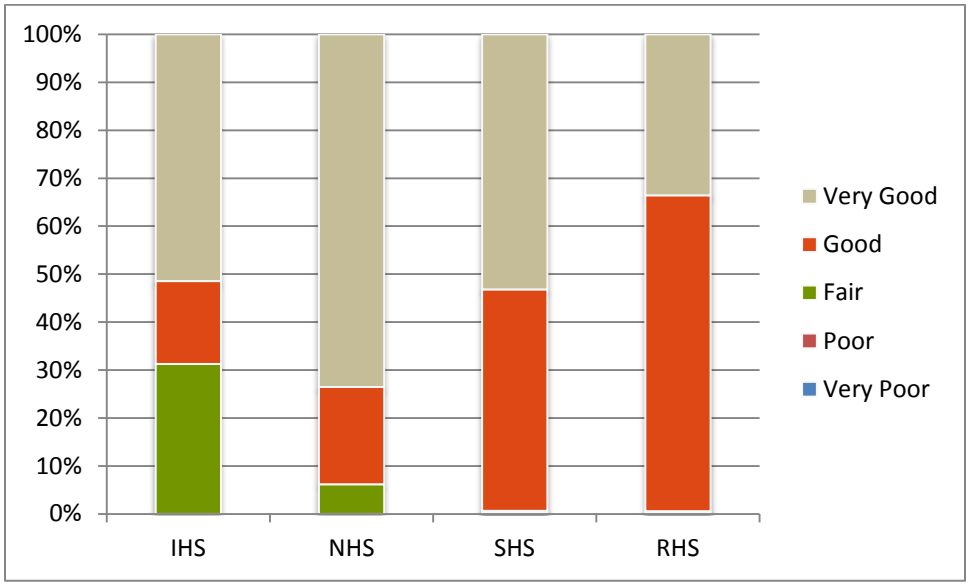
[8] *Sections may be improved more than once over the forecasting period.*

National Highway System Pavement Conditions. The final year estimates for non-interstate roadways on the National Highway System show that 73.5 percent of the pavement would be in very good condition, 20.3 percent in good condition, and 6.2 percent in fair condition.

State Highway System Pavement Conditions. The final year estimates for the Statewide Highway System show that 53.2 percent of the pavement would be in very good condition and 46.1 percent in good condition. Less than 1 percent of the SHS miles would be at or below fair condition.

Regional Highway System Pavement Conditions. The final year estimates for the Regional Highway System show that 33.5 percent of the pavement would be in very good condition and 65.9 percent in good condition. About 0.6 percent of the RHS miles would be at or below fair condition.

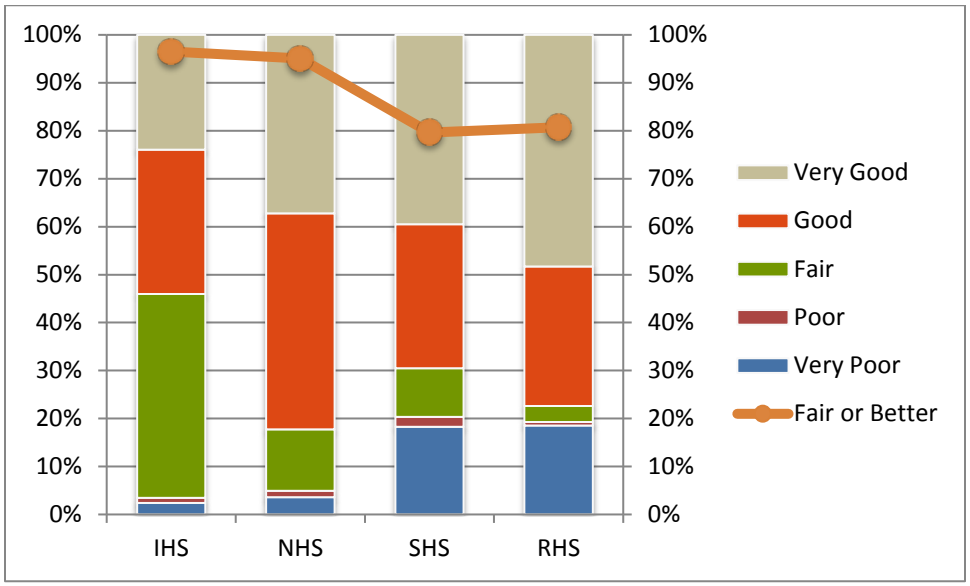
Figure 5-1: Forecast Pavement Condition at End of Analysis Period, Full Needs Analysis



Source: DOTD

Figure 5-2 depicts the performance outcomes of an investment strategy focused on strictly meeting the performance targets at the least possible cost. The goal needs analysis produced performance outcomes that attained the average targets at a cost of $11.4 billion. However, the percentage of total pavement in very poor condition- near or exceeding 20 percent for both the RHS and SHS - is worse than current conditions.

Figure 5-2: Forecast Pavement Condition at End of Analysis Period, Goal Needs Analysis



Source: DOTD

5.3.2 Bridge Needs

The Department's bridge performance objectives are as follows:

- No more than 10 percent of total deck area on the state system ("on-system") in structurally deficient condition

Typical bridge improvements can be summarized as:

- **Preventive Maintenance** – Includes routine repair of worn bridge parts and maintenance, with actions that prolong the life of the bridge such as cleaning and painting, sealing and waterproofing, and lubricating bridge bearings
- **Modernization** – Addresses functional obsolescence through various improvements such as widening, raising or improving the geometric alignment of the road and bridge
- **Rehabilitation or reconstruction** of the entire bridge structure

State System Needs

The estimated level of funding needed to maintain the DOTD's state-owned bridges in a state of good repair and exceed the DOTD's performance objectives over the 30 year Plan timeframe is $7.2 billion. Over 3,880 treatments are needed to address existing needs (backlog), and these needs account for 24 percent ($1.7 billion) of the total (**Table 5-5**).

Table 5-5: Bridge Needs by Improvement Category (in millions of 2010 dollars, State System)

Analysis	Bridges Treated[9]		Cost	
	Count	Percent	$ (Million)	Percent
Backlog	3,882	23.30%	$1,707.89	23.76%
Accruing	12,781	76.70%	$5,479.11	76.24%
Total	**16,663**	**100%**	**$7,187.00**	**100%**

Source: DOTD

As shown in in **Table 5-6**, bridge replacements, which are more costly than modernization or preventive maintenance, account for slightly less than two thirds of the total cost. A third of the bridge needs investment will be required for preventive maintenance.

Table 5-6: Bridge Needs by State of Good Repair Activity (in millions of 2010 dollars, State System)

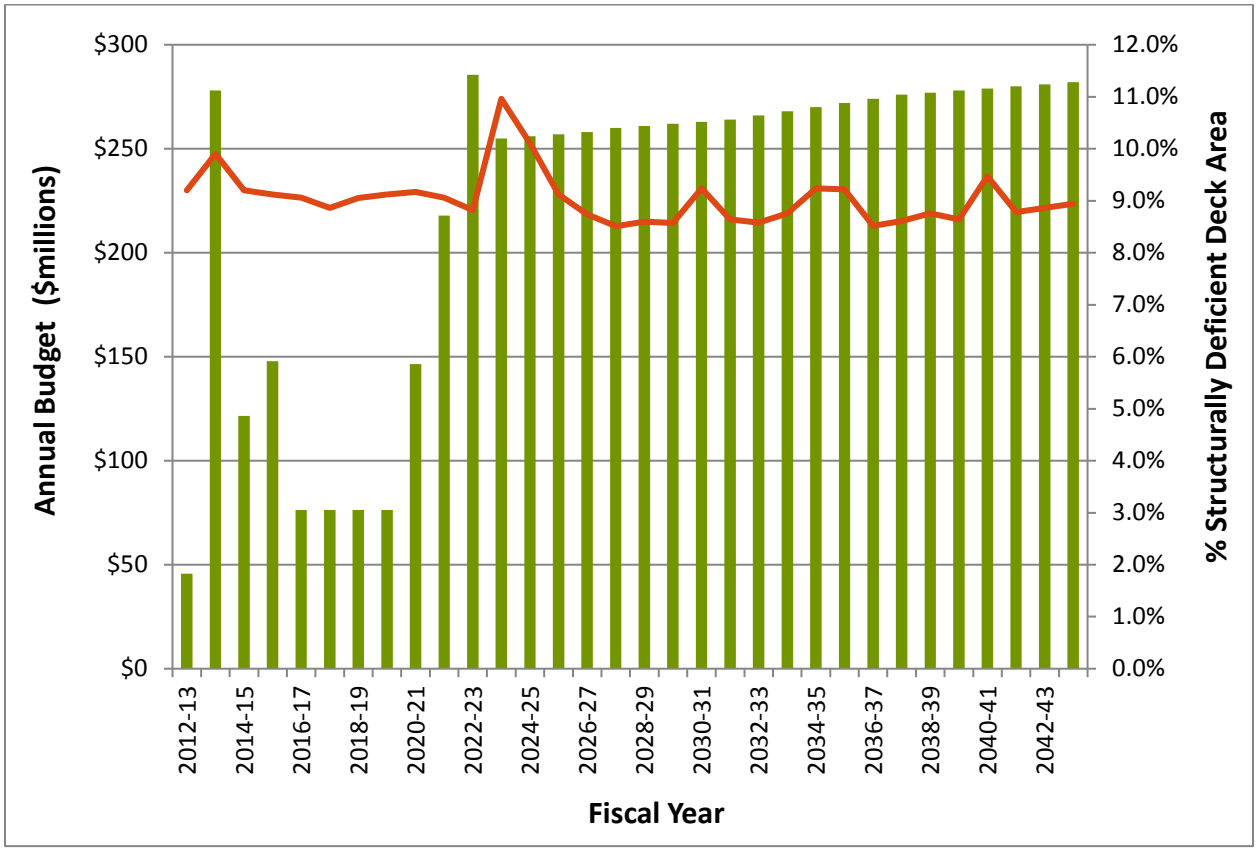
Improvement Category	Bridges Treated[9]		Cost	
	Count	Percent	$ (Million)	Percent
Preservation	14,482	86.90%	$2,386.08	33.20%
Modernization	1,173	7.00%	$143.74	2.00%
Replacement	1,008	6.00%	$4,657.18	64.80%
Total	**16,663**	100%	**$7,187.00**	100%

Source: DOTD

The performance outcomes from this analysis are shown in **Figure 5-3** below. Before 2020, the average annual expenditure needed to maintain an acceptable level of performance is $212 million. After 2020, the Department must increase spending to address the higher cost bridge replacements and bridge rehabilitations that will be needed over the following 24 years. Over $262 million annually will be needed to maintain bridge conditions at the 10 percent objective by the end of the 30 year plan horizon.

[9] *Multiple bridge treatments on individual bridges occur during the analysis period.*

Figure 5-3: Investment Needs and Forecast Bridge Condition, by Year (in millions of 2010 dollars, State System)



Source: DOTD

Total Bridge Needs

Off-system bridges account for approximately 30 percent of the total bridge deck area in the state. Total estimated needs to achieve plan objectives for the off-state system amount to $2.0 billion, of which 45 percent are backlog needs. Bridge needs for the state and off-state system are a combined total of $9.2 billion (**Table 5-7)**.

Table 5-7: Total Bridge Needs (in millions of 2010 dollars)

Analysis	State System		Off-state System		Total	Percent
	$(Million)	Percent	$(Million)	Percent		
Backlog	$1,707.89	35.53%	$892.51	45.05%	$2,600.40	28.36%
Accruing	$5,479.11	64.47%	$1,088.64	54.95%	$6,567.75	71.64%
Total	**$7,187.00**	**100.00%**	**$1,981.15**	**100%**	**$9,168.15**	100%

Source: DOTD

5.3.3 Operational and Motorist Service Improvement Needs

Operational and motorist service needs encompass non-capacity investments, including ITS and traffic operations expenditures as well as those for unique program elements such as ferries. The needs estimate provides for normal system replacements and adding elements where there are current or likely future operational issues.

Table 5-8 shows the existing and future investments needs for operations and motorist services. The total 30 year need is estimated at $1.8 billion, consisting of $193 million in backlog and $1.6 billion in future or accruing needs. The $1.8 billion total corresponds to an annual investment of $56 million, to bring the system to desired levels of performance.

Table 5-8: Operational and Motorist Service Improvement Needs – Historical and Projected (in millions of 2010 dollars)

Type of Improvement	Backlog	Accruing	Total
ITS-Capital Equipment Replacement	$12.43	$16.36	$28.80
Signals	$76.51	$824.00	$900.51
Interstate Striping	$7.65	$133.00	$140.65
Interstate Signs	$12.43	$64.00	$76.43
Rest Areas & Weight Stations	$71.72	$93.00	$164.72
Movable Bridges (Electrical/ Mechanical)	$6.69	$251.00	$257.69
Ferries	$1.91	$72.00	$73.91
Roadway Flooding	$3.83	$144.00	$147.83
Total	**$193.18**	**$1,597.36**	**$1,790.54**

Source: DOTD and CDM Smith

5.3.4 Safety Needs

The DOTD analyzes the cause of traffic accidents on the state system and where appropriate, designs roadway improvements to reduce the likelihood of future accidents. DOTD also identifies locations with the potential for traffic conflicts and accidents to occur and addresses those as part of its annual needs analysis. The team developed consensus estimates of future (accruing needs) based on historical trends. These expenditures are intended to reduce accidents and improve safety performance.

Total safety needs as shown in **Table 5-9** amount to $178 million, of which $80 million or 45 percent is needed to meet current (backlog) needs. Eliminating at-grade railroad crossings requires $127 million, or 71 percent of the total.

Table 5-9: Safety Needs by Improvement (in millions of 2010 dollars)

	Backlog	Accruing	Total
Shoulders	$22.00	$26.60	$48.59
Vertical Clearance	$0.96	$1.21	$2.17
Railroad Crossings	$57.38	$69.38	$126.76
Total	**$80.33**	**$97.19**	**$177.52**

Source: DOTD and CDM Smith

5.3.5 Mobility and Congestion

The Department's performance objectives for highway mobility performance are:

- Maintain 90 percent or greater of the Interstate Highway System in uncongested conditions
- Maintain 90 percent or greater of the NHS[10] in uncongested conditions

[10] The NHS is the system of highways and bridges of national significance for mobility, the economy and defense. The federal NHS program provides capital improvement funding for these roads.

DOTD analyzes existing capacity needs annually, and produces an estimate of backlog needs. The plan team augmented that analysis with a forecast of future needs. The primary forecasting tool for this purpose, HERS-ST, was configured to identify potential improvements in locations at which volumes exceed capacity and cause delay. The Plan team also used the statewide travel demand model in this analysis. Some sections are not feasible to widen due to a physical or environmental constraint. Operations investments were considered appropriate measures in these cases.

The forecasted need for capacity and congestion is $6.7 billion and affects 1,000 miles of roadway. Of this total, TSM needs total $119 million. **Table 5-10** presents the total costs and the improvement mileage.

Table 5-10: Highway Mobility Needs (in millions of 2010 dollars)

Improvement	Backlog	Accruing	Total ($M)
Adding Lanes	$5,598.28	$980.30	$6,578.58
TSM		$118.80	$118.80
Total	**$5,598.28**	**$1,099.10**	**$6,697.38**
Miles Improved	885	167	1,052

Source: CDM Smith and DOTD

5.3.6 Highway Needs Summary

The total DOTD system needs to meet the statewide transportation plan goals over the 30 year plan horizon are estimated to be $35.9 billion. Of this total, $24.8 billion or 69.1 percent consists of pavement and capacity needs and $9.2 billion to bridge needs (**Table 5-11**). The annual needs estimate for achieving the DOTD's plan objectives is $1.1 billion.

Table 5-11: Summary of Highway Needs (in millions of 2010 dollars)

System Element	Backlog	Accruing	Total	Percentage of Total
Pavement	$3,706.90	$14,452.46	$18,159.36	50.5%
Bridge	$2,600.40	$6,567.75	$9,168.15	25.5%
Mobility/Capacity	$5,598.28	$1,099.10	$6,697.38	18.6%
Operations/Motorist Services	$193.18	$1,597.36	$1,790.54	5.0%
Safety	$80.33	$97.19	$177.52	0.5%
Total	**$12,179.09**	**$23,813.86**	**$35,992.95**	**100%**

Source: DOTD and CDM Smith

5.3.7 Trucking Needs

Over the next 30 years, motor carriers will require a combination of infrastructure investments and policy strategies to operate efficiently and effectively. Policies and investments that benefit motor carriers can enhance safety and, improve level of service, which reduces the risk of accidents and increases productivity.

The factors influencing the freight transportation system are constantly changing as cost, time and customer demands change. Changing technologies, economic conditions, shifts in supply chain methodologies, the availability of providers and the locations of users within the system, are constantly evolving as well. However, the need for access, mobility and good intermodal connections between regions and states is a constant, and the Plan has reached out directly to the motor carrier community to understand and document the most important investments and policies to advance.

Motor Carrier Survey

An efficient, reliable and safe roadway system sets the conditions for supporting private sector supply chains. To be economically competitive, industries must be able to get their products to the right place at the right time for the right price. A 2012 survey of motor carriers conducted as part of the Plan indicated that of the factors influencing efficient truck operations, the most important today are congestion relief, road/bridge conditions, and roadway design.

The prioritization of freight-centric projects differs somewhat from those needed for general transportation. Motor carriers have designed their operations to be as efficient and productive as possible, given the many factors beyond their control, including land use development and the design of transportation facilities. **Table 5-12** below presents the results of a motor carrier survey in which operators were asked to rate a number of transportation issues by level of importance.

Table 5-12: Factors Influencing Truck Efficiency, a Carrier's View of Importance

Factor	High	Medium	Low
Congestion-delay	40.0%	60.0%	0.0%
Road-Bridge Condition (rough pavement, deficient bridges, lack of maintenance)	30.0%	70.0%	0.0%
Permitting Process and Policies (oversize, hazardous material)	22.2%	33.3%	44.4%
Roadway Design (geometrics, number of lanes)	20.0%	80.0%	0.0%
Access Management (access on-off roadways)	20.0%	60.0%	20.0%
Lane Management (HOV, HOT, lane segregation or restriction)	20.0%	40.0%	40.0%
Lack of Roadways ("Cannot get there from here")	20.0%	40.0%	40.0%
Roadway Design Features (livability, enhancements, landscaping)	10.0%	60.0%	30.0%
Truck Parking (availability, proximity)	0.0%	80.0%	20.0%
Signage, Signalization (roadway-commercial signage, traffic signal timing-extent)	0.0%	80.0%	20.0%
Land Use Designation (commercial zone locations versus residential)	0.0%	70.0%	30.0%

Source: 2012 Louisiana Motor Carrier Survey

Top rated factors include those that have the potential to impact vehicle wear, cargo damage, and productivity. Areas which influence driver retention, ease of access, and way finding are important to a lesser degree. Those factors which are outside the control of the carrier, e.g. new roadways, and those which are restricted from commercial vehicle operations, e.g. managed lanes, elicited a lower level of concern.

- **Factors with Highest Influence**
  - Congestion-delay
  - Road-Bridge Condition (rough pavement, deficient bridges, lack of maintenance)
- **Factors with Medium Influence**
  - Permitting Process and Policies (oversize, hazardous material)
  - Roadway Design (geometrics, number of lanes)
  - Access Management (access on-off roadways)
  - Lane Management (HOV, HOT, lane segregation or restriction)
  - Lack of Roadways ("Cannot get there from here")
- **Factors with Low Influence**
  - Roadway Design Features (livability, enhancements, landscaping)
  - Truck Parking (availability, proximity)
  - Signage, Signalization (roadway-commercial signage, traffic signal timing-extent)
  - Land Use Designation (commercial zone locations versus residential)

Review of Trucking Recommendations, Infrastructure and Policy (2008)

An online survey and phone interview process with the private sector reviewed trucking needs identified in the 2008 Review and Status Report on the Statewide Transportation Plan. These interviews recorded the trucking industry's observations toward the transportation needs of motor carriers and the State's freight transportation system. While no 2008 Plan need registered as extremely important, extending the hours of service at truck terminals and re-establishing a motor carrier advisory committee scored higher than the other recommendations. The responses are noted in **Table 5-13** below.

Table 5-13: Industry Observations on 2008 Plan Recommendations

2008 Update (2003 base) Needs	No Longer Important	Important	Extremely Important	No Opinion
Create economic development incentives to encourage extended hours at truck terminals, including port facilities	10.0%	60.0%	0.0%	30.0%
Re-establish Motor Carrier Advisory Committee	0.0%	60.0%	0.0%	40.0%
Relocate and/or redesign the weigh station along I-10 at the Texas Line	0.0%	40.0%	0.0%	60.0%
Establish structured presence for private sector in MPO planning processes	10.0%	40.0%	0.0%	50.0%
Accelerate establishment of a virtual one-stop state truck center	0.0%	30.0%	0.0%	70.0%
Develop model truck facility site access design standards	20.0%	30.0%	0.0%	50.0%
Construct a new weigh station along I-49 at the Arkansas Line	10.0%	20.0%	0.0%	70.0%

Source: 2012 Louisiana Motor Carrier Survey

5.3.8 Ports and Waterways Needs

The DOTD is a "partner" with the ports and waterways authorities in Louisiana. The DOTD does not have a direct responsibility for ports and waterways — the waterways are under federal jurisdiction (U.S. Army Corps of Engineers, USACE)—and ports are independent authorities or private operations for the most part. DOTD does have a legislatively mandated Port Priority Program used to fund approximately $20M per year in port improvements. Funding for waterway needs is primarily determined by USACE, in cooperation with local authorities

The Port Construction and Development Priority Program was created by Act 452 of the 1989 Regular Session of the Louisiana Legislature. The Transportation Trust Fund, which was approved as a constitutional amendment effective in January 1990, is the source of funding for Port Priority Program.

The creation of the Port Construction & Development Priority Program within the DOTD changed the method by which the state participates in port improvements. Under this program, the feasibility of proposed port projects must be determined and the projects must be prioritized. Any Louisiana port authority may apply for funding of a proposed port project. The requirements for applying for port funding through the program include providing a project description; demonstrating an immediate need; estimating the benefits to be derived; providing a preliminary design, and providing a cost estimate. Approximately $20 million per fiscal year is available to fund current projects and near-term future projects.

The program provides assistance to Louisiana ports for improving operations and increasing capacity. The main criteria by which projects are selected and funded relate to the benefit-cost analysis (must be greater than 1.0), return on investment comparison (2.375 percent return in revenue to the State), value engineering, and best management practices.

Projects funded by the program facilitate improvement and expansion of public owned port facilities. Types of projects considered include wharves, cargo handling, capital equipment, utilities, transit sheds, internal access roads and railroad improvements.

Typically, projects funded by the program are in various phases of completion. New construction, facility reconstruction and improvement and expansion of publicly owned port facilities, including intermodal facilities and maritime-related industrial park infrastructure developments are examples of the types of projects funded by the program. Projects considered can include wharves, cargo handling capital equipment, utilities, railroads, and primary access roads and buildings that are an integral component of any proposed port project.

Projects currently funded under the program are in varying phases of completion and include those in design and construction phases. Based on current state fiscal spending allocations to the program ($20 million per year); projects are incrementally funded as year to year funding becomes available—therefore a backlog for project completion exists as funding becomes available. Future program funds

(from the DOTD program) are the source of nearly $120 million for project completion. This translates to a backlog of 5-6 years of program funding to complete current projects within the program. As additional project applications are submitted and approved for funding, the funding backlog and years to completion continue to grow. Project selection criteria are not the only limiting factor. Funding constraints lengthen the timeframe for completing projects and limit the number of projects that can be completed. For immediate project needs, ports are self-financing projects in advance of program funding reimbursement, with the knowledge that those projects have met and been approved through the Port Priority Program—further compromising and limiting future funding streams. For larger ports that have multiple ongoing projects within the program, a limitation of up to $15 million for that port is applied. If program funding is extended into future years, it may take many years to complete projects with the limitation of incremental annual funding. Therefore, a consensus was developed that the Port Priority Program has a need for $50 million per year, an increase of $30 million over the existing $20 million per year.

Ports and Waterways Needs Summary

Ports and waterway corridors sustain the very significant levels of trade that moves by barge and ship through, from, and to Louisiana, and transportation needs exist to accommodate both current and future demand. Ports and waterways needs for preservation and expansion are presented in **Table 5-14.**

The needs estimates has relied more on existing reports and discussions with operators than using performance measures in a forecasting sense per se. However, important cost estimates were based on achieving a quantitative outcome, such as deepening the Mississippi River channels to a depth suitable for deep-draft ships. Three high priority needs for both the waterway corridors and the ports are deepening the Mississippi River, deepening of channels along the coast, and lock infrastructure repair or replacement.

The plan team developed the estimates from several sources. For dredging and channel maintenance costs, the actual costs incurred for the year 2010 were provided by USACE, both Vicksburg and New Orleans Districts. For deepening of the Mississippi River, an estimated cost prepared by USACE, New Orleans, was used. Assuming similar field conditions for deepening of coastal channels, costs were estimated to be approximately 33 percent of the cost of the Mississippi River. Lock replacement costs also were conservatively estimated based on 2008 costs for replacement of the Inner Harbor Navigation Lock. Operating costs to maintain the ports were available for most major ports and used as a measure of preservation needs. However, port expansion costs require an understanding of property development, the demand for capacity by new tenants, land value estimates, infrastructure development, costs etc., and would require information and evaluation that is beyond the scope of this planning effort.

Expansion needs far exceed preservation needs. Conservatively, expansion costs are estimated at over $6.6 billion dollars—nearly 23 times the costs to sustain current conditions. As noted, no estimates have been developed for ports expansion.

Table 5-14: Ports and Waterways Needs Totals for 30 Years (in thousands of 2010 dollars)

Type of Need	Sustain	Expansion	Total [1]
Waterway Needs	$290,349	$6,652,000	$6,942,349
Port Needs[2]	$182,778	N/A	$182,778
Total	**$473,127**	**$6,652,000**	**$7,125,127**

Notes: (1) Needs in Thousands, for projects where needs have been estimated. (2) The ports needs includes only the readily available cost estimates for a few of the ports. All ports needs were not available. Source: CDM Smith

5.3.9 Freight Rail Needs

Louisiana DOTD's role in freight rail is as a participant. As such DOTD supports railroads operating in the state by providing policy support, guidelines, and/or complementary and opportunistic funding to advance the goals and objectives of the Plan. Freight rail improvement projects provide benefits to the state and its citizens in terms of improved safety and economic competitiveness; and to private railroads and their customers through increased efficiency in freight movements and operations.

Freight rail needs were identified directly by DOTD and the railroad companies themselves as planned future improvement projects. These projects fall into one of the following groups of improvements:

- Modernization needs to bring the existing system to current standards of safety and reliability
- Capacity needs for expansion of the existing system
- Operational needs to improve system efficiency

In addition to these planned improvement projects, preservation needs to keep the existing and future system safe and in a state of good repair will be met by the railroads' maintenance activities.

Short Range Freight Rail Needs

Freight rail needs over the next four years total $189.1 million, as summarized in **Table 5-15**. These needs include modernization, operations, and capacity improvement projects that will enhance public safety and improve economic competitiveness in the state. At-grade railroad crossing improvements are planned in the next five years at an estimated cost of $11.2 million. These improvements are primarily designed to enhance public safety and reduce the number of incidents at highway/railroad crossings. Highway safety improvement projects must be consistent with a state's Strategic Highway Safety Plan (SHSP) and should logically flow from identified SHSP emphasis areas and strategies.

Table 5-15: Summary of Short Range Freight Rail Needs (in millions of 2010 dollars)

Short-Range Needs in Years 1-4	Estimated Cost ($M)
New Orleans Rail Gateway	$49.7
286K upgrade for short lines	$41.0
NOGC rail relocation	$40.5
Station improvements	$9.5
Crossing improvements	$11.2
Grade separations	$37.2
Total	**$189.1**

Source: DOTD

Long Range Freight Rail Needs

Freight rail improvement projects planned for implementation beyond the five-year horizon are considered long range projects. Freight rail needs over the long range (5-30 years) total $967.7 million. These needs include modernization, operations, and capacity improvement projects that will enhance public safety and improve economic competitiveness in the state as shown in **Table 5-16**. The latter projects include four designed to improve safety through selected road closures and signage improvements and three that represent a continuation of major projects spanning both short and long range time frames, namely:

- New Orleans Rail Gateway – The proposed project includes rail improvements that would improve the fluidity, reliability, and capacity of rail services for the interchange of local industry and Port of New Orleans traffic as well as the exchange of East-West rail traffic
- Short line track upgrades to handle 286,000-bound maximum carload weights
- Relocation of New Orleans and Gulf Coast Railroad tracks south of New Orleans to access new port facilities

Table 5-16: Summary of Long Range Freight Rail Needs (in millions of 2010 dollars)

Long-Range Needs in Years 5-30	Estimated Cost ($M)
New Orleans Rail Gateway	$447.1
286K upgrade for short lines	$164.0
NOGC rail relocation	$229.5
Crossings improvements	$2.9
Grade separations	$72.5
Other short line needs	$51.5
Total	**$967.7**

Source: DOTD

Total freight rail needs, short- and long-range, are $1,156.8 million.

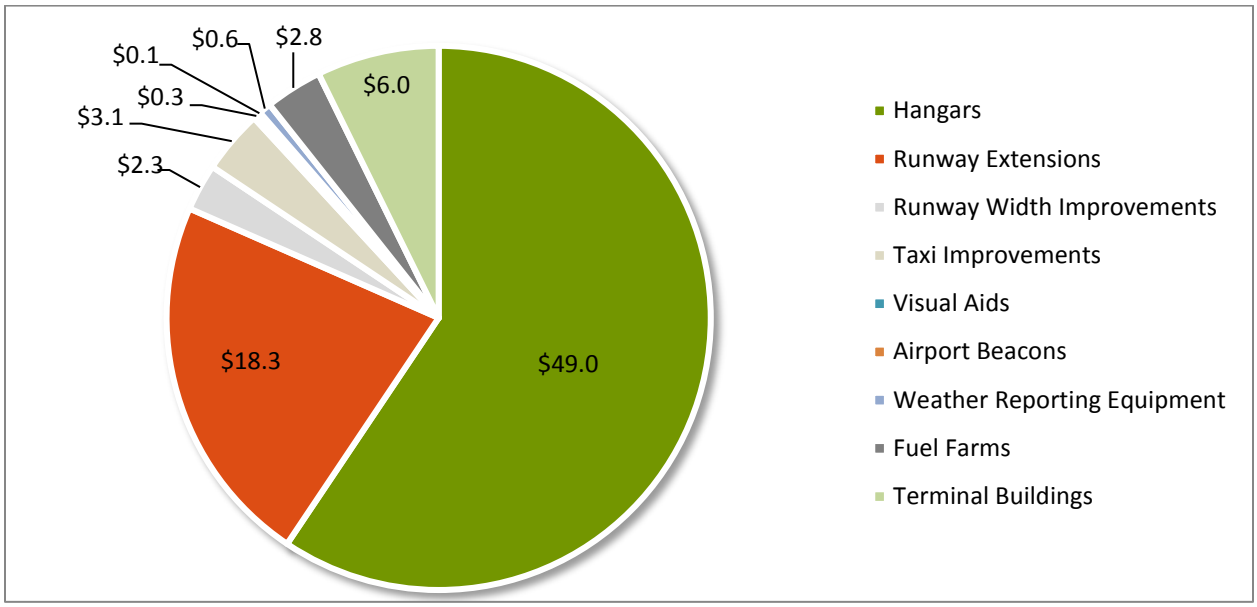
5.3.10 Aviation Needs

The needs of the Louisiana airport system were defined as capital projects identified as aiding Louisiana's airports in fulfilling the role that had been assigned to each airport as well as the costs of non-system related capital projects at airports, of off-airport NAVAIDs, and other costs.

Estimated Cost of Improving Louisiana Aviation System Plan Airports

The cost of maintaining and improving the Louisiana airport system is born by the airport sponsors, the state, and the FAA, with the FAA providing a significant portion of the funding support for general aviation capital projects. With 56 airports in the NPIAS, annual AIP entitlements alone are approximately $8 million, if every airport were to apply for the funds. The *2015 Louisiana Aviation System Plan* identified the areas of airport improvement the system needed to adequately meet the roles each airport was assigned. These projects address safety, capacity, and access issues at airports. For each airport role, facility objectives were established. These facility objectives served as benchmarks for measuring certain elements of system performance, as well as identifying areas where improvements would enhance the performance of the aviation system. It is estimated that the cost of those improvements amounts to $82.4 million, with more than half of that cost attributed to hangars, as shown in **Figure 5-4**.

Figure 5-4: Allocation of System Improvements (in millions of 2010 dollars)

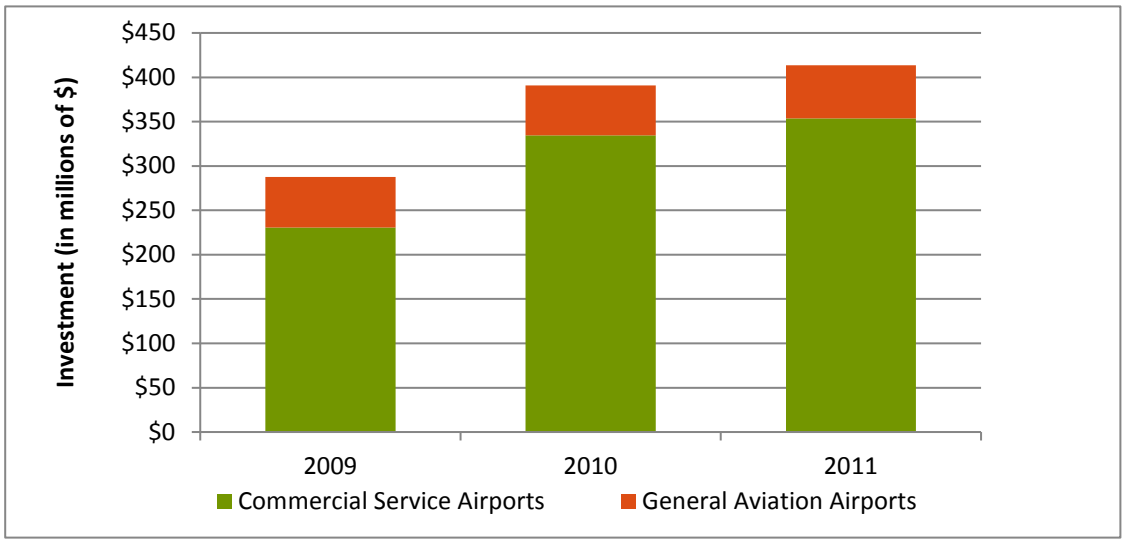


Source: 2015 Aviation System Plan, CDM Smith

Funding for these aviation needs can come from local, state, and federal sources, as well as private contributions. Local funding can include money from the local sponsor and any revenue that the airport itself generates through concession fees, or the sale of products and services. The DOTD's Aviation Section works with an annual grant budget of approximately $28 million. It uses this money to fund airport projects that are not eligible for FAA funding and to cover the matching funds for certain federal grants. For example, runway extensions are eligible for federal funding, whereas, hangar construction is not. Federal funds generally come from FAA Airport Improvement Program grants. In 2011, the FAA awarded more than $61 million in grants to Louisiana airports. The bulk of that, $49 million, went to the commercial service airports.

It should be noted that the aviation needs identified are only part of the total capital expenditures of Louisiana's airports. As shown in **Figure 5-5**, capital expenditures at Louisiana's airports have risen since 2009, from just under $300 million to more than $400 million in 2011. The majority of this spending occurs at Louisiana's commercial service airports. By funding the identified $82.4 million in aviation needs, the Louisiana airport system can function more efficiently and safely than it already does.

Figure 5-5: Historic Capital Improvement Expenditures at Louisiana's System Airports (in millions of 2010 dollars)



Source: DOTD

Total Aviation System Costs

The prior section described the capital costs associated with improvements determined at the system level. These are only a fraction of the total system costs. To adequately plan for the aviation system's capital needs over the next 30 years, the costs of non-system related capital projects at airports, of off-airport NAVAIDs, and other costs need to be taken into account.

Table 5-17 lists the major cost items that will drive the capital needs of the Louisiana aviation system over the next 30 years. The system plan improvements, discussed above, are estimated to cost more than $80 million. Using 5-year capital improvement plans (CIPs) submitted by each system airport, it was estimated that unfunded system airport needs over the next 30 years are approximately $1.1 billion.

Table 5-17: Louisiana Aviation System Needs over 30 Years (in billions of 2010 dollars)

System Need	Estimated Cost (in $B)
System plan improvements	$0.08
Unfunded system airport needs over 30 years, based on 5-year CIP plans	$1.10
Passenger facility charge funded construction	$0.92
Pavement maintenance	$0.53
NAVAID projects	$0.03
New terminal at MSY	$0.65
Contingency funding	$0.17
Total Costs	**$3.48**

Source: 2015 Louisiana Aviation System Plan, CDM Smith

NAVAID projects called for $30 million in funding over the next 30 years. Another $648 million was budgeted for a new terminal at New Orleans International Airport. Lastly, $170 million was added to the budget to account for unforeseen contingencies. This was estimated by taking 15 percent of the unfunded system airport needs. When all these items are totaled, the Louisiana aviation system is estimated to need $3.48 billion over the next 30 years.

Projects funded by passenger facility charges (PFC), which are collected at all seven commercial service airports in Louisiana, were estimated through the forecast of enplanements for the state. Assuming that these airports continue to collect PFCs through 2044, it is estimated that these funds will support $916 million in project needs. Upkeep and maintenance of airport pavement, which includes runways, taxiways, and aprons at the system airports, is expected to cost approximately $534 million out to 2044.

5.3.11 Public Transportation Needs

Transit Maintenance and Preservation Needs

The transit needs to maintain and sustain the existing public transportation system are summarized in **Table 5-18** for the different transit programs provided in Louisiana. These include the operating and capital costs to maintain the existing services through 2044. Annual costs and total costs are also presented. A total of almost $6.8 billion is shown for both operating and capital for the next 30 years.

Table 5-18: Transit Maintenance and Preservation Needs (in millions of 2010 dollars)

FTA Program Category		Operating		Capital		Operating + Capital
		Maintain Service (Annual)	Maintain Service through 2044	Maintain Service (Annual)	Maintain Service through 2044	Through 2044
5307	Urban	$149.0	$4,916.6	$44.5	$1,333.9	$6,250.5
5310	Enhanced Mobility of Seniors & Indivs. w/ Disabilities	n/a	n/a	$1.7	$52.5	$52.5
5311	Rural	$7.6	$249.7	$4.0	$121.0	$370.7
5311 (f)	Intercity Bus	$2.3	$76.4	$0.2	$5.6	$82.0
	Total	**$158.9**	**$5,242.8**	**$50.4**	**$1,512.9**	**$6,755.7**

Source: DOTD

5.3.12 Modernization of Services

This long range plan assumes a conservative approach to cost estimates and service levels using a 2 percent increase for the urban, rural and specialized transit programs. This modest and conservative approach is realistic for DOTD and will make small improvements to the public transportation system in the future. **Table 5-19** shows a summary of the operating and capital costs for the modernization or enhanced transit services through 2044. A total of $432 million is needed for both operating and capital costs for the next 30 years.

Table 5-19: Transit Modernization and Enhanced Service Needs (in millions of 2010 dollars)

FTA Program Category		Enhance Services through 2044		
		Operating	Capital	Total
5307	Urban	$123.3	$299.0	$422.2
5310	Enhanced Mobility of Seniors & Individuals w/ Disabilities	n/a	$1.0	$1.0
5311	Rural	$4.5	$2.4	$7.0
5311(f)	Intercity Bus	$1.4	$0.1	$1.5
	Total	**$129.2**	**$302.6**	**$431.7**

Source: DOTD

5.3.13 Summary of Statewide Transit Needs

To summarize, the total public transportation needs to maintain existing transit services and for enhanced transit services, not including passenger rail, is shown in **Table 5-20**. A total of $7.2 billion is shown for both system preservation and modernization for the next 30 years.

Table 5-20: Total Public Transportation Needs (in millions of 2010 dollars)

FTA Program Category		Maintenance and Preservation through 2044			Modernization/Enhanced Services through 2044			Maintain + Enhanced
		Operating	Capital	Operating/ Capital	Operating	Capital	Operating / Capital	Operating / Capital
5307	Urban	$4,916.6	$1,333.9	$6,250.5	$123.3	$299.0	$422.2	$6,672.7
5310	Enhanced Mobility of Seniors & Individuals w/ Disabilities	n/a	$52.5	$52.5	n/a	$1.0	$1.0	$53.5
5311	Rural	$249.7	$121.0	$370.7	$4.5	$2.4	$7.0	$377.7
5311 (f)	Intercity Bus	$76.4	$5.6	$82.0	$1.4	$0.1	$1.5	$83.5
	Total	**$5,242.8**	**$1,512.9**	**$6,755.7**	**$129.2**	**$302.6**	**$431.7**	**$7,187.4**

Source: DOTD

The Louisiana transit network consists of a wide variety of services. Both general public transit services and specialized transportation for the elderly and disabled are important components of the State's transportation network. Louisiana's urbanized areas continue to plan for the future that includes increased levels of transit services. Regions with major activity centers are focusing on maintaining and providing enhanced transit services and transportation options for employees who often commute long distances. Both rural and urbanized transit systems are planning for the projected increased demand in services for the elderly and disabled.

Although DOTD has responsibility for multimodal transportation planning, most of the authority over funding of transit services either lies with transit agencies or the private sector. DOTD continues to

coordinate with these entities, but one of the biggest challenges over the next decade and beyond will be in securing additional transit operating funds to address growing transit needs. It is difficult to estimate the annual available funds since this is dependent upon federal and state legislative actions.

Passenger Rail Needs

Amtrak has total fiscal responsibility for its long-distance routes. In Louisiana there are no state supported corridor routes for which the state has the financial responsibility to cover operating losses. Therefore, the state has limited means available to improve overall service levels of Amtrak trains. Capital investments related to the intercity rail corridor must be made at the regional level with concurrence by other states served by the route as well as the host railroad(s).

Two passenger rail initiatives are currently under consideration: intercity service between Baton Rouge and New Orleans; and between Shreveport/Bossier City and Dallas/Fort Worth, with potential extensions to Vicksburg or Meridian, Mississippi and NS's Crescent Corridor. DOTD is also a member of the Southern Rail Commission, which seeks to implement higher speed service between New Orleans and Houston, between New Orleans and Atlanta, and between New Orleans and Mobile. Passenger rail capital needs are listed in **Table 5-21**. Operating subsidies are not included in this estimate.

Table 5-21: Louisiana Passenger Rail Capital Needs (in millions of 2010 dollars)

Project	Capital Cost
Shreveport - Dallas intercity rail[1]	$300.0
Baton Rouge - New Orleans intercity rail[2]	$262.0
Total	**$562.0**

Sources: [1] 2015 Louisiana Rail Plan. [2] Baton Rouge – New Orleans Intercity Rail Feasibility Study, Strategic Business Plan, Final Report, February 2014.

5.3.14 Bicycle and Pedestrian Needs

DOTD's role in the bicycle and pedestrian modes is as a partner – the Department shares responsibility with other entities in decision-making, training, and funding. Municipalities look to the DOTD for leadership in design standards, model programs, and coordination of activities at a statewide and national level. Specific projects and associated funding identified in this Plan are intended to be undertaken as a partnership between, federal, state, and local governments. Historically the DOTD has administered competitive grant programs, such as Transportation Alternatives (formerly Transportation Enhancements) funding.

The *2009 Statewide Bicycle and Pedestrian Plan* and the *2010 Complete Streets Work Group Final Report* clearly outline the action items necessary for improving Louisiana's transportation system to accommodate all users and abilities including bicyclists and pedestrians. For planning purposes, a long range cost estimate was developed for implementing bicycle and pedestrian facilities on roadways operated by the DOTD. The analysis included assumptions of implementing pedestrian and bicycle facilities on a percentage of roadway miles by 2044. **Table 5-22** summarizes the projected funding needs, which total $384 million.

The bicycle and pedestrian needs assessment summarizes the recommended needs associated with implementing a comprehensive transportation program with the DOTD. The DOTD has recently shown its commitment to supporting transportation for all users, however, much can still be done to ensure

that bicycle and pedestrian facilities are regularly incorporated at each stage of every project. In addition to DOTD's role in the implementation of bicycle and pedestrian facilities, there is also a need for better coordination with regional and local jurisdictions to create a comprehensive transportation network regardless of jurisdictional boundaries.

Table 5-22: Forecasted Bicycle and Pedestrian Infrastructure Cost Estimates* (in millions of 2010 dollars)

Facility Type	2010 Mileage	Future Mileage	% with Bike/Ped Facilities by 2044	Bike/Ped Total
Rural Principal Arterials	981	1,030	10%[1]	$30.86
Rural Major Arterials	1,582	1,661	5%[1]	$24.88
Rural Minor Arterials	1,582	1,661	5%[2]	$26.88
Rural Major Collectors	4,668	4,901	10%[3]	$87.54
Rural Minor Collectors	2,967	3,115	5%[3]	$27.82
Urban Expressways	50	52	2%[4]	$0.33
Urban Principal Arterials[6]	899	944	25%[1]	$70.70
Urban Minor Arterials[6]	1,218	1,279	20%[1]	$76.63
Urban Collectors[6]	811	851	10%[1]	$25.51
Urban Collectors[6]			10%[5]	$13.16
Total				**$384.32**

** Analysis does not include ROW acquisition costs which may vary greatly by facility*
[1] Bike lanes and sidewalks (2 sides of road)
[2] Striped paved shoulders and sidewalks (2 sides of road)
[3] Striped paved shoulders and sidewalk (1 side of road)
[4] Shared use path
[5] Bike lanes and sidewalk (1 side of road)
[6] Urban Facility Costs are typically bundled into MPO budgets for reconstruction and resurfacing projects and not stand alone projects

5.4 Needs Summary

Table 5-23 summarizes the total transportation infrastructure needs for Louisiana through 2044.

Table 5-23: Total Transportation Funding Needs for Louisiana (in billions of 2010 dollars)

Mode	Needs
Road & Bridge	$35.99
Ports and Waterways	$7.13
Freight Rail	$1.16
Aviation	$3.48
Transit	$7.19
Passenger Rail	$0.56
Bicycle and Pedestrian	$0.38
Total	**$55.89**

Note: Constant 2010 dollars

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