Presentation To

Toledo-Detroit Ridership Feasibility & Cost Estimate Study

November 5, 2018

Presentation By

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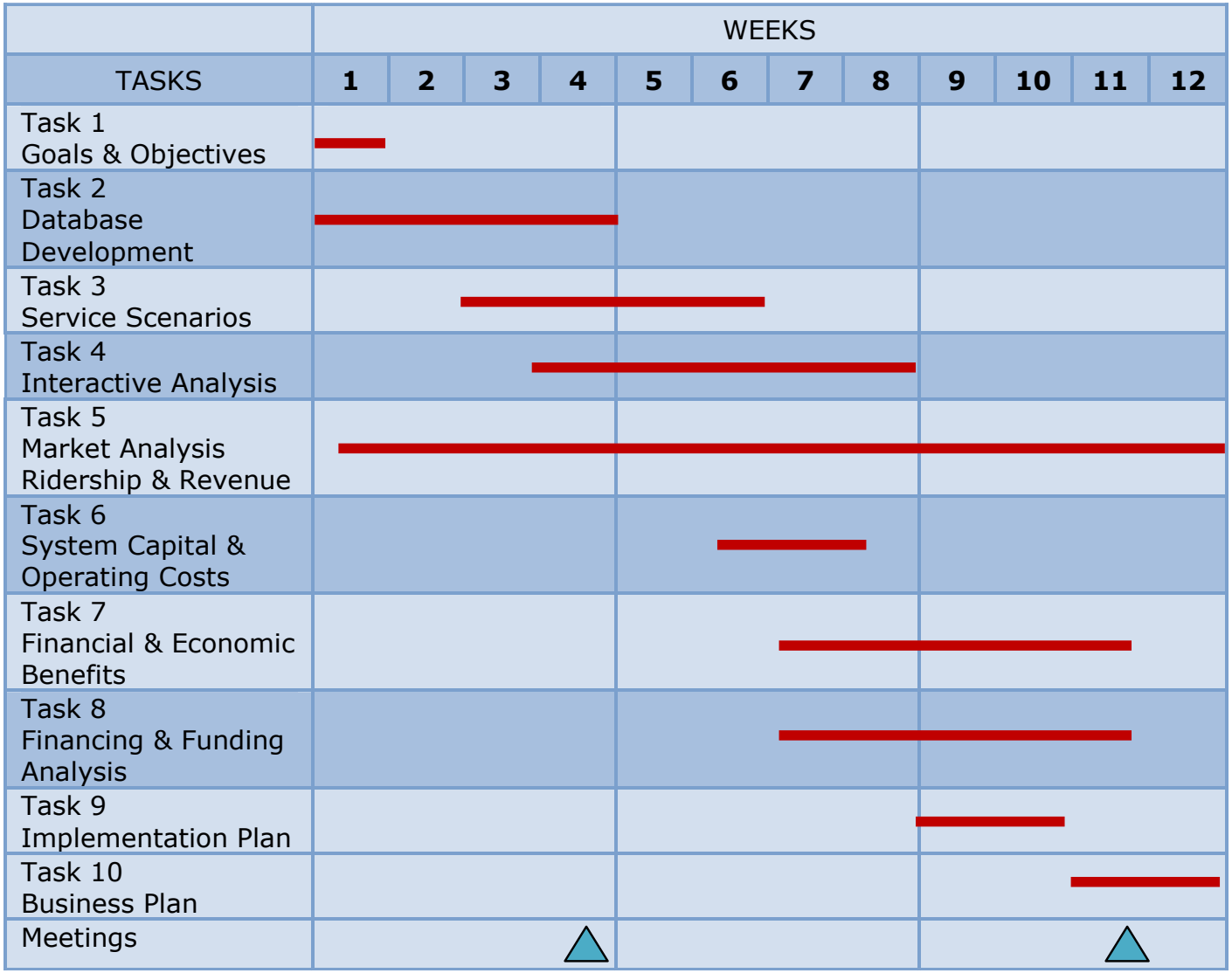
TEMS

Transportation Economics & Management Systems, Inc.

Study Time Line



Task 1: Goals and Study Objectives

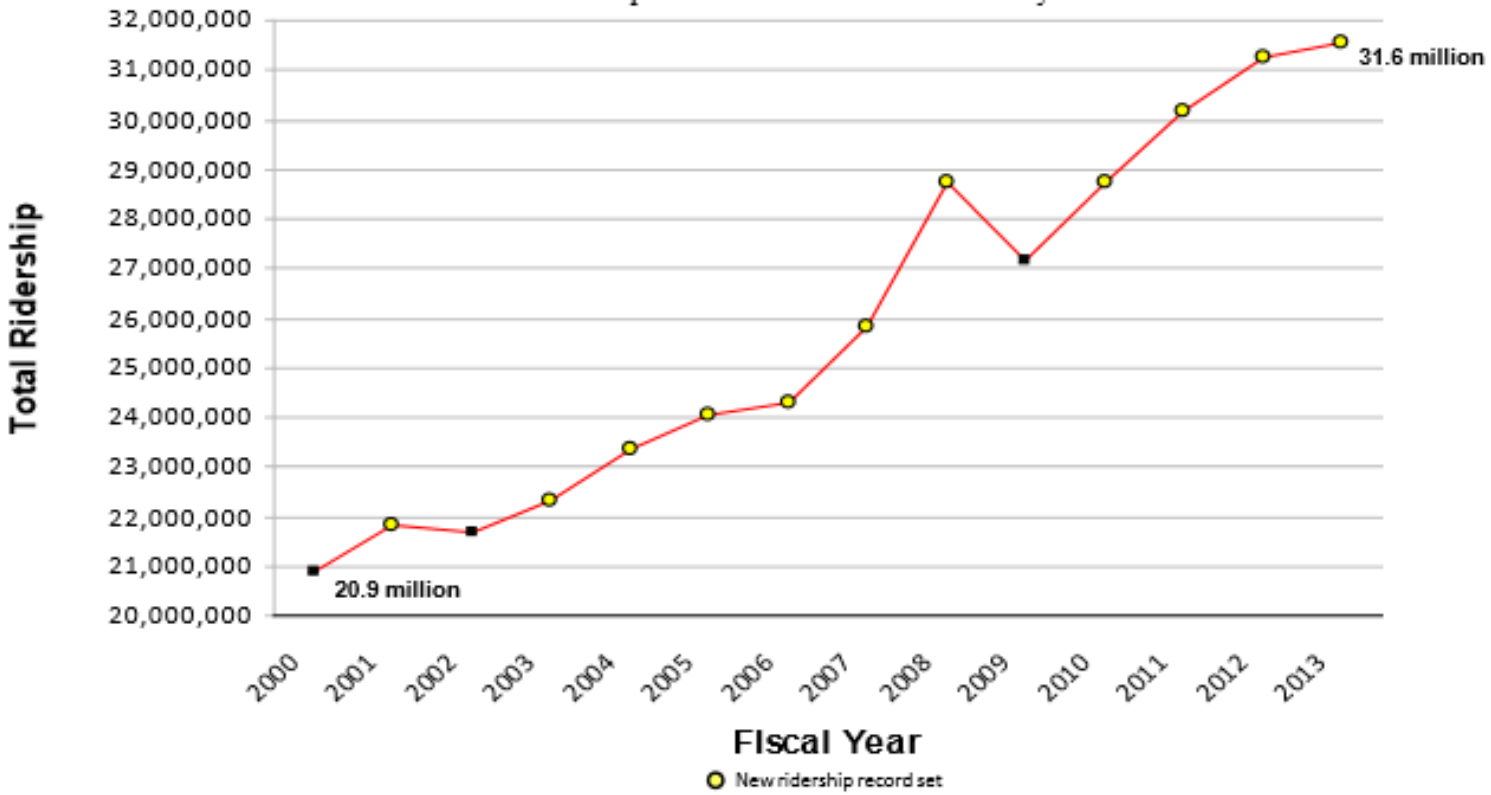
- To assess the potential for passenger rail service from Toledo to Southeast Michigan including Detroit, Dearborn, Ann Arbor and Detroit Airport
- To identify the economic benefits of the passenger rail project to the Toledo-Detroit corridor.

Amtrak Ridership Growth -- Driven by oil prices and congestion

"Amtrak moves people, the economy and the nation forward everywhere the trains go."
Amtrak President and CEO Joe Boardman

Ridership record of 31.6 million passengers in FY2013

New ridership record set in 10 of the last 11 years

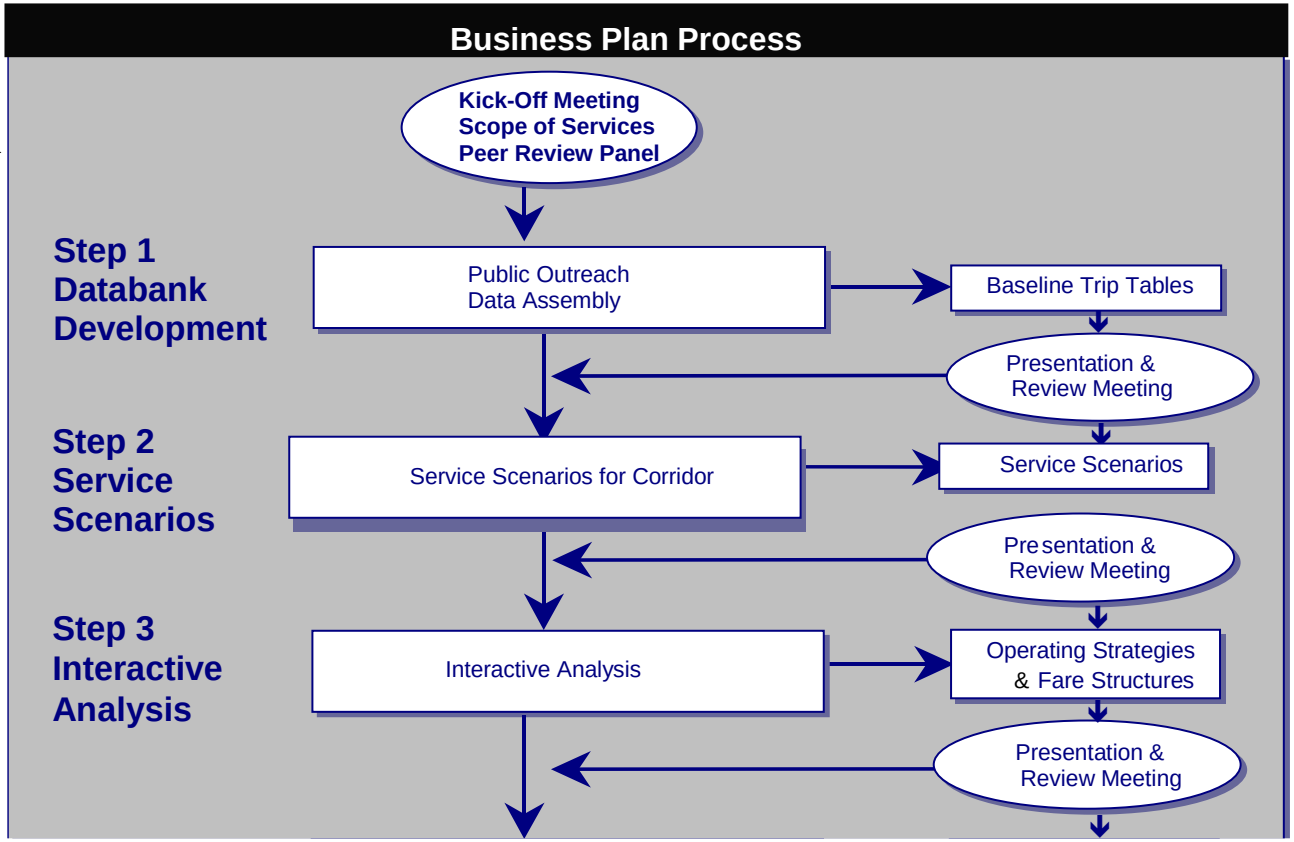


October 2013

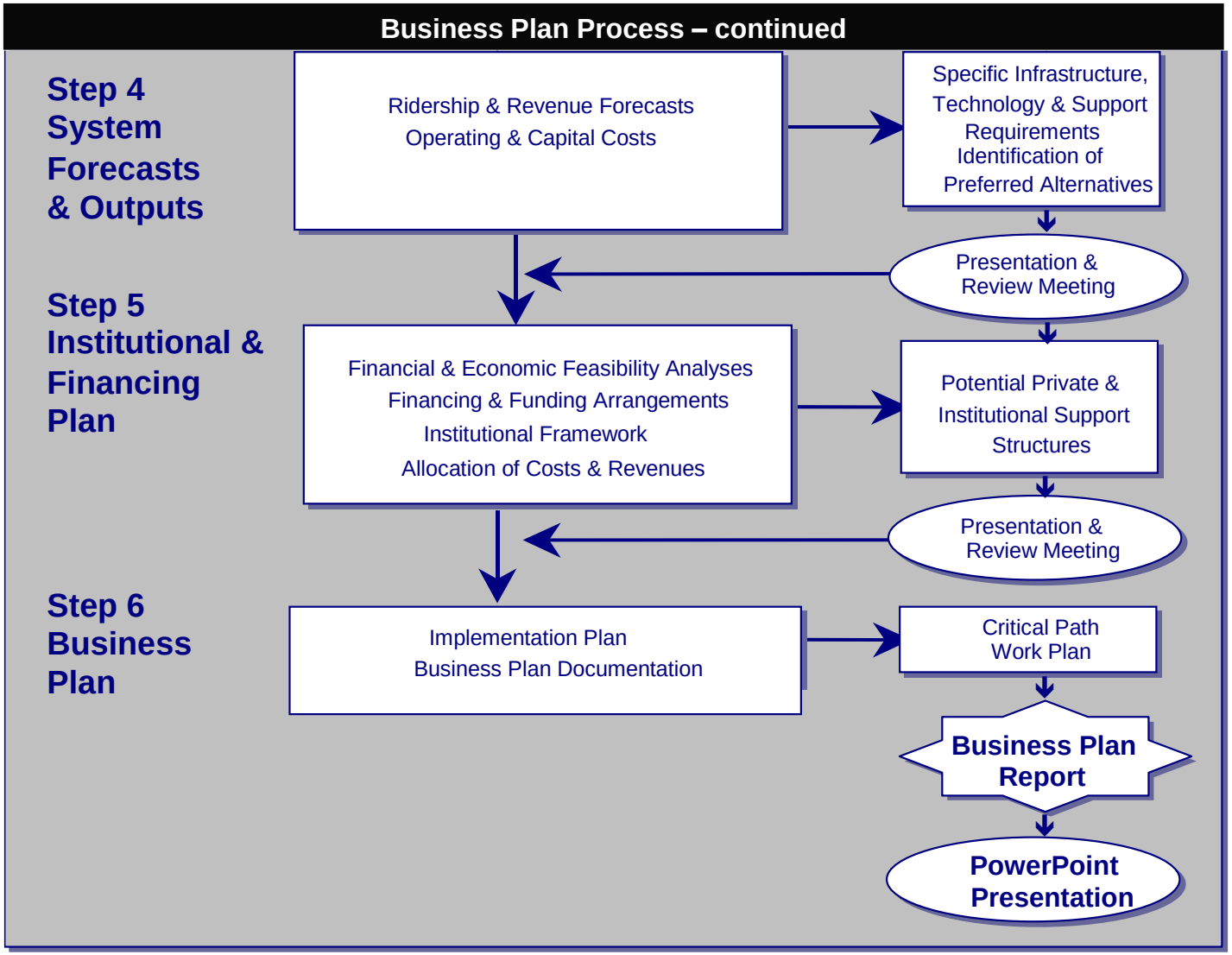
Business Plan Process

Business Plan Six Step Process

- Stated Preference Survey
- Investment Grade Ridership Forecasts
- Computerized Track Database
- Community Economic Development
- Implementation and Business Plan
- Pro forma Financials



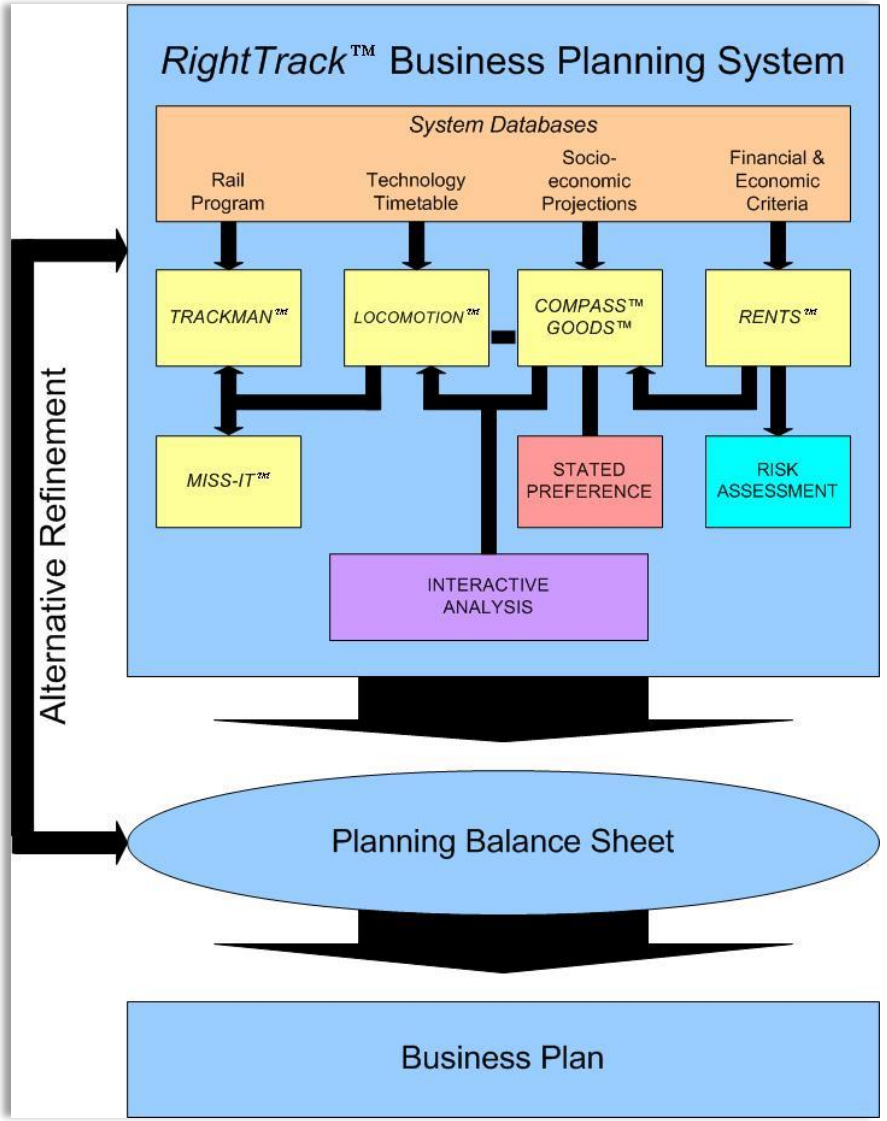
Business Plan Process



RIGHTTRACK™

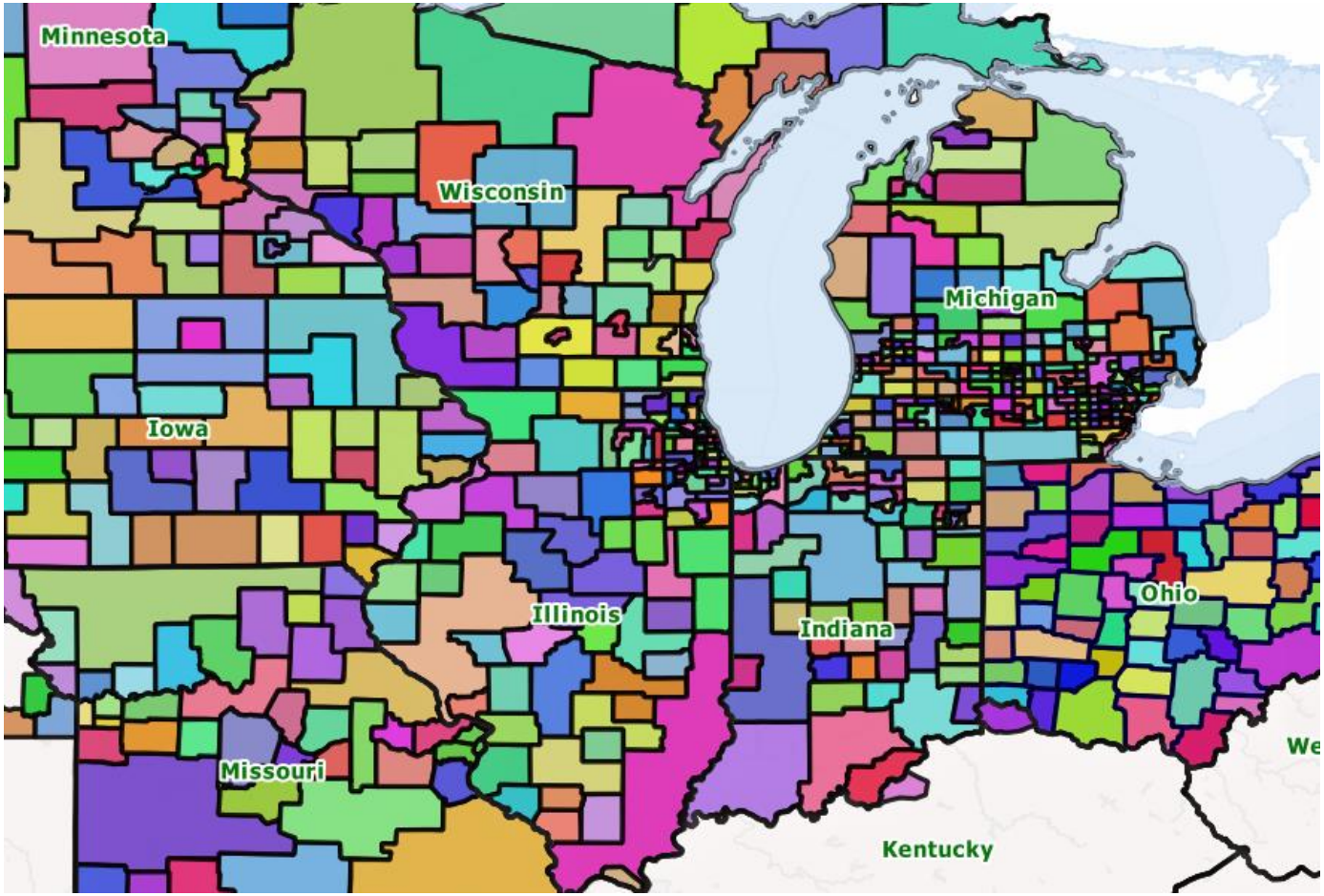
The work will be efficiently completed using the…….

RightTrack™ Business Planning System



Task 2: Database Development
Regional Zone System

Chicago-Detroit/Toledo Corridor Area Zones



Database Sources

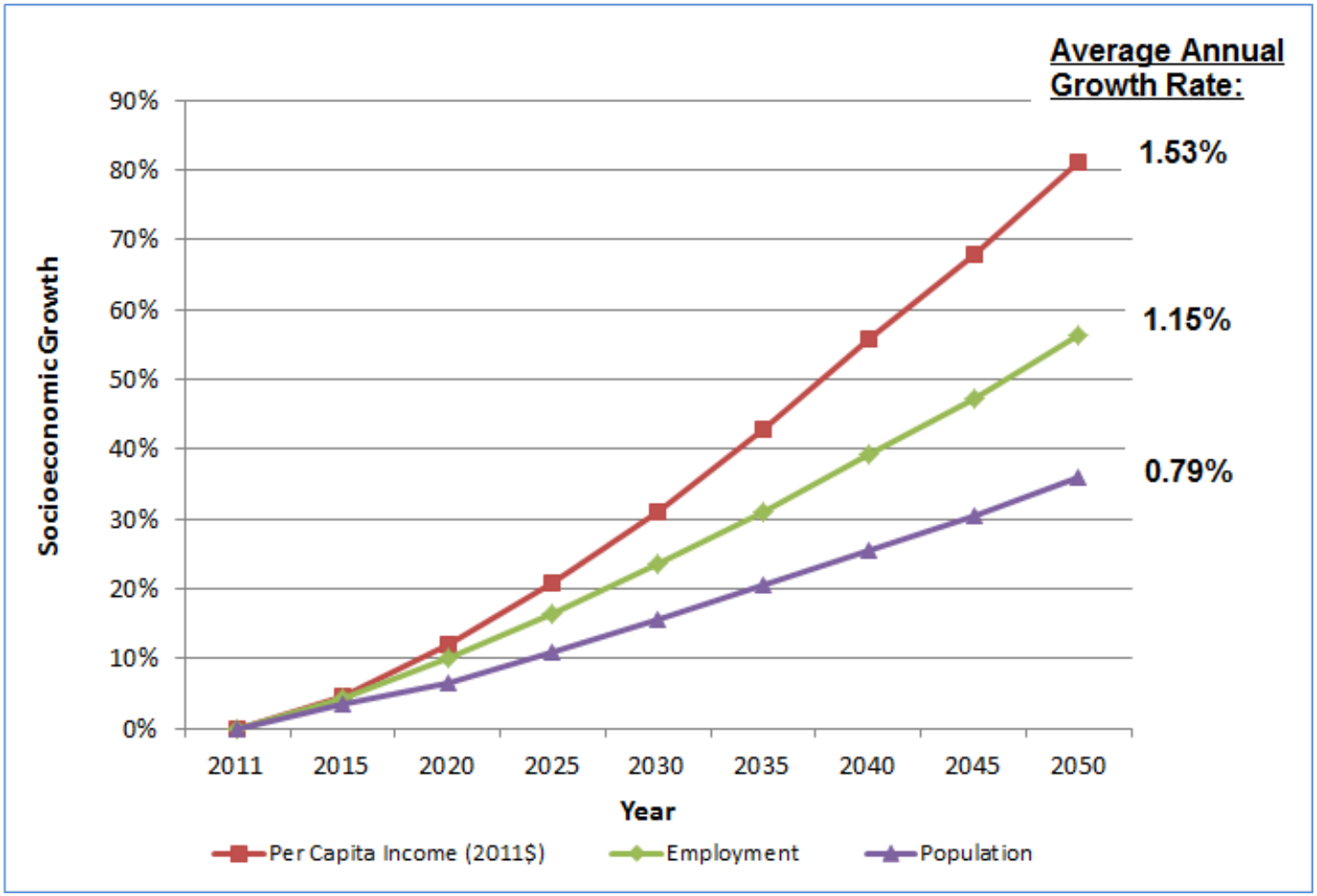
Sources for Base Year and Forecast Year Socioeconomic Database:

The socioeconomic data developed for the study region contains population, employment, and income information of county-level, census tract level, and community-level data from the following sources:

- U.S. Census Bureau
- Woods & Poole Economics
- Bureau of Economic Analysis
- Local Planning Agencies (SEMCOG, TMACOG)

Task 2: Database Development

Study Area Projected Socioeconomic Variables Growth Rates



Task 2: Competitive Modal Networks

Sources of Existing Transportation Services

Networks include:

- **Highway Networks from**
  - State and Local Departments of Transportation highway databases
  - The Bureau of Transportation Statistics HPMS (Highway Performance Monitoring System) database
- **Rail Networks from**
  - Amtrak schedules
  - Amtrak on-time performance data
- **Air Networks from**
  - Airline schedules
  - The ten percent sample of airline tickets
  - Airline on-time performance data
- **Bus Networks from**
  - Greyhound, Megabus, and Indian Trailways

Task 2: Database Development
Transportation Database

Network Attributes Included in COMPASS™ Transportation Networks

	Public Modes	Auto
Time	In-vehicle Time Access/Egress Time Transfer Time Wait Time	Travel Time Congestion Delay
Costs	Fare Access/Egress Costs Parking	Operating Costs* Tolls* Parking*
Schedule	Headway Convenience of Times	

*** Divided by occupancy**

Task 2: Engineering Database Conditions and Proposed Improvements

ENGINEERING DATABASE:

The engineering database will consider the Toledo – Detroit Corridor from Detroit – Ann Arbor.

Task 2: Analysis of Rail Track Conditions and Proposed Improvements

The ENGINEERING DATABASE will be developed using:

- **The TRACKMAN™ program will provide a milepost-by-milepost record of rail gradients and geometry of the right-of-way.**
- **Data will be compiled from existing sources including:**
  - **Railroad timetables**
  - **Track charts**
  - **USGS topographic maps**
  - **Commercially available orthophotography**
- **The database will provide a basis for estimating operating speeds and train times.**

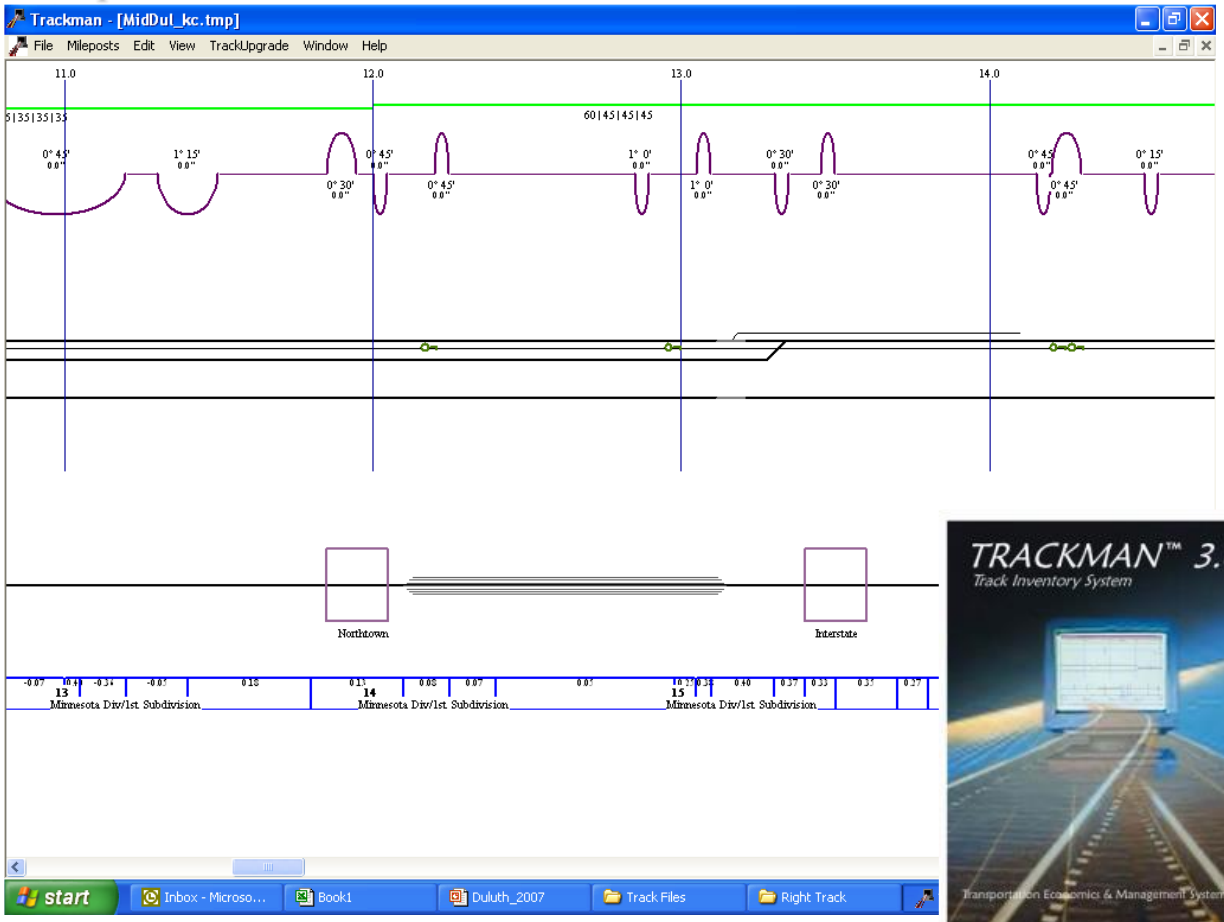
Task 2: TRACKMAN™ Database

TRACKMAN™ we will develop detailed information on each route.

Key inputs: **Speeds, curves, grades, rail and highway crossings, and other potential speed restrictions such as moveable bridges.**

All the data is being captured in a consistent computerized format, to facilitate train performance and future line capacity evaluation.

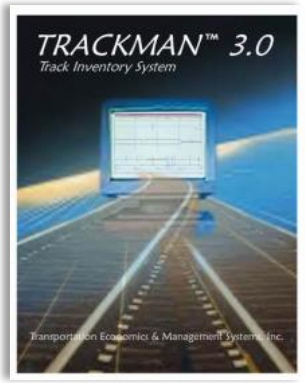
Sample Duluth Data



Task 2: TRACKMAN™ Cost Estimation

TRACKMAN™ will estimate the Engineering Capital Costs:

- **Field Review to Verify Conditions and Update TRACKMAN™ Track Chart Data.**
- **Adjust Unit Costs to Local Engineering Conditions.**
- **Develop Specific Infrastructure Proposals and Cost Estimates for each set of right of way Speed Improvements and Line Capacity Upgrades.**



Task 2: Route and Technologies

Technology Database

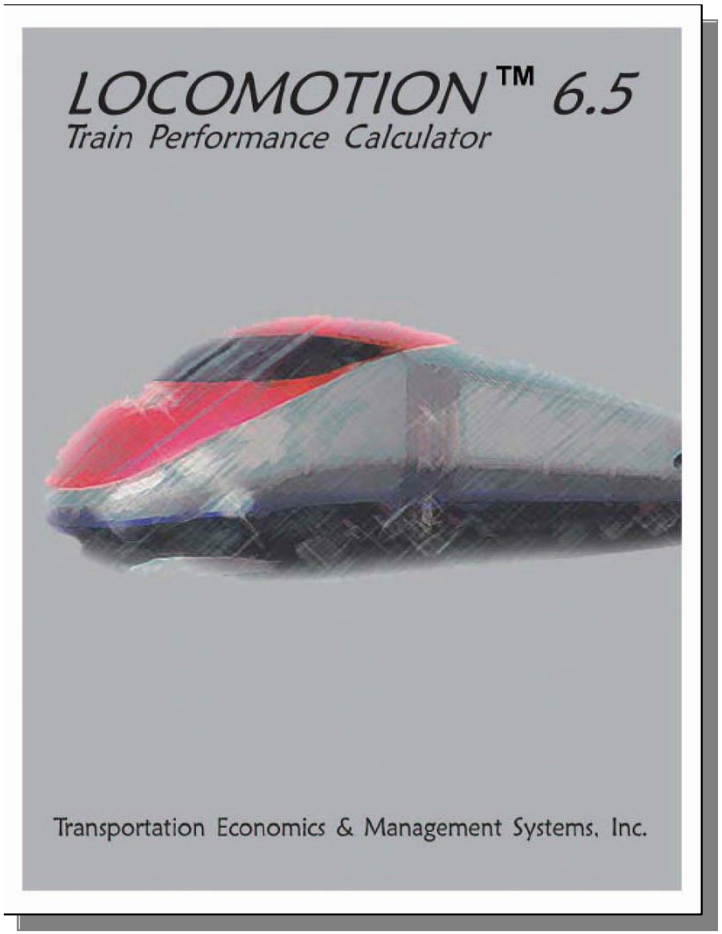
- **The technology database will be developed by reviewing the results of previous studies, and soliciting information from manufacturers to update TEMS existing databank.**
- **It is anticipated that the focus will be on 79 mph to 110 mph technology.**

79 mph-Amtrak

110 mph-Talgo

Task 2: Technology Database

LOCOMOTION™ will estimate Train Speeds and Timetables

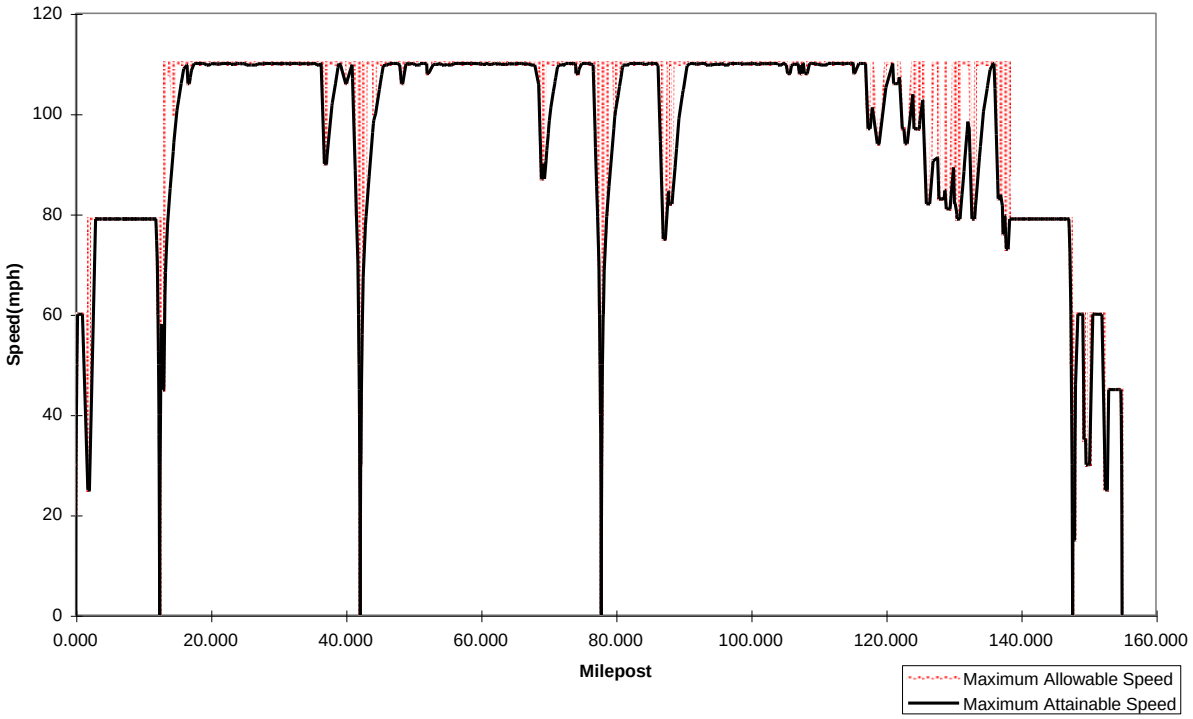


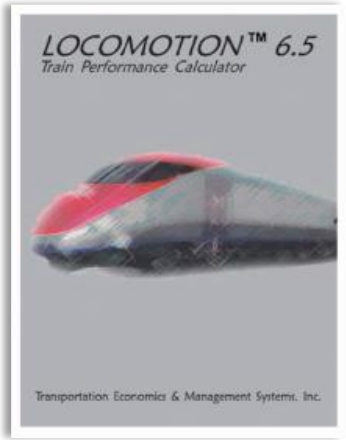
- **LOCOMOTION™** generates optimized timetables for given track infrastructure, signaling systems, and train technologies. It provides milepost-by-milepost graphic output of train performance based on track characteristics and shows the effect on timetables for improving the track, using a different technology.
- Because **LOCOMOTION™** takes account of other passenger and freight traffic using a right-of-way, it can develop stringline diagrams and identify the optimum train path for a new service.

Task 3: Analysis of Route Speeds and Service Scenarios

LOCOMOTION™ will be used to assess all the different technologies

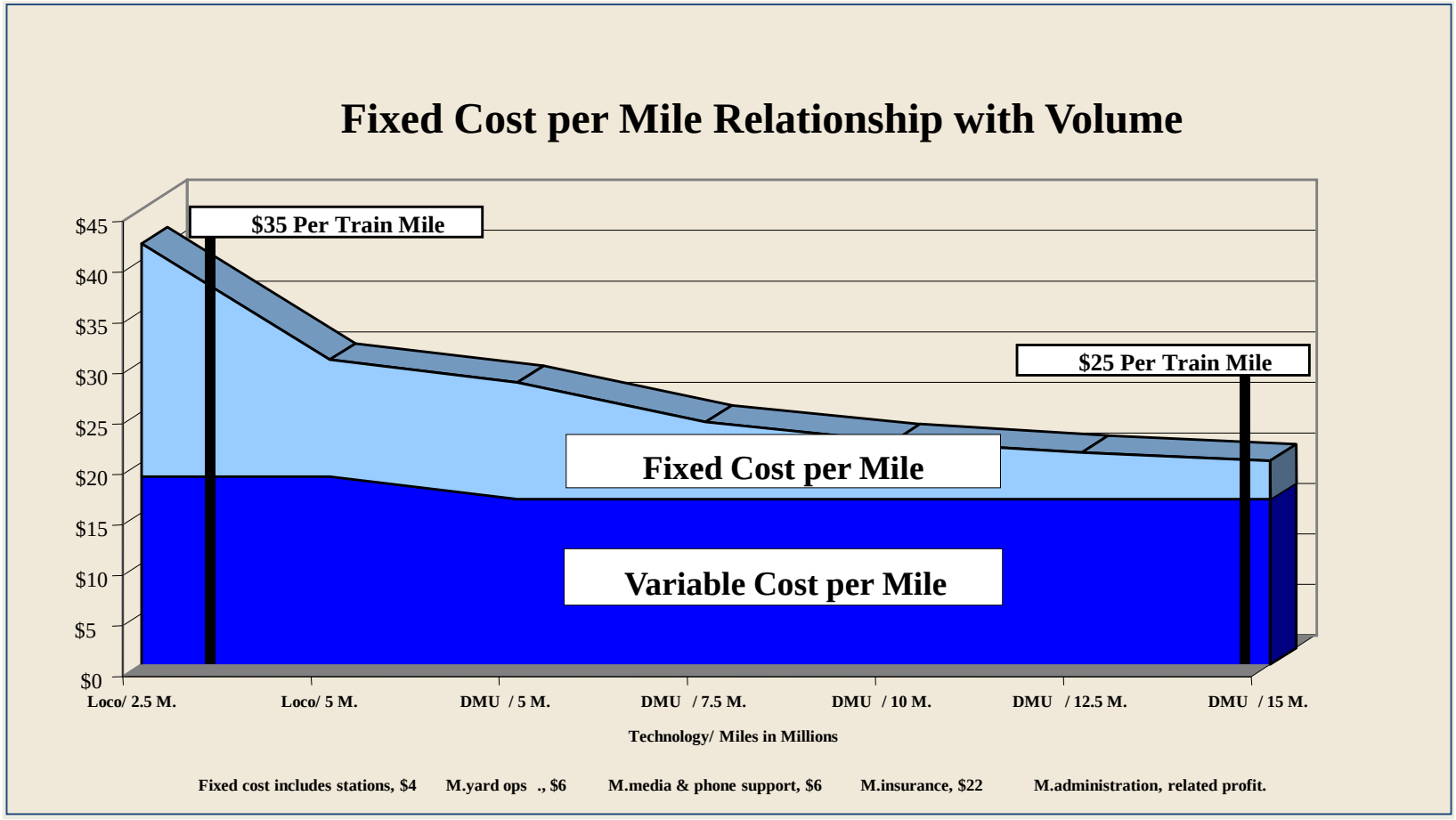
Speed Profile – Minneapolis to Duluth
110-mph service -- 2:00 schedule





Task 3: Cost Tradeoffs

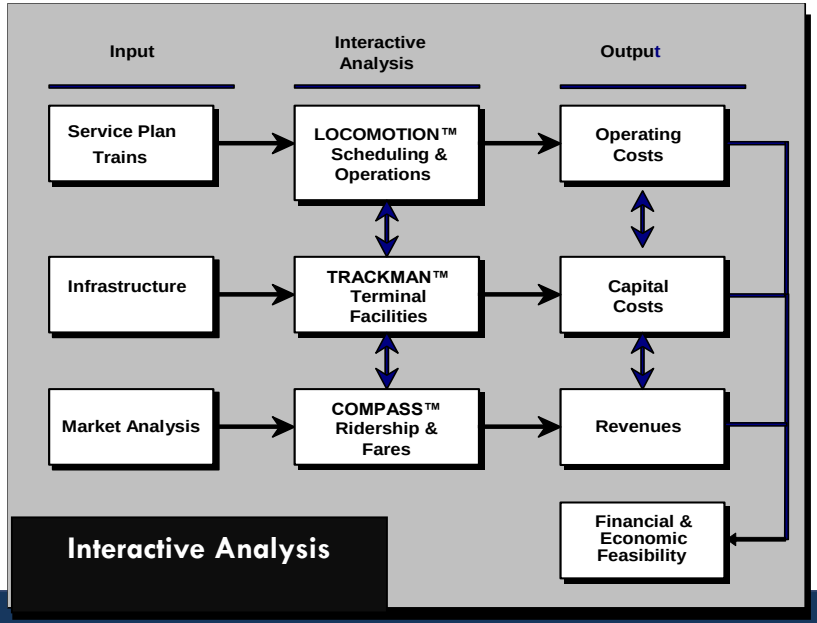
How fixed and variable operating costs change with increasing train miles



Task 4: Interactive Analysis

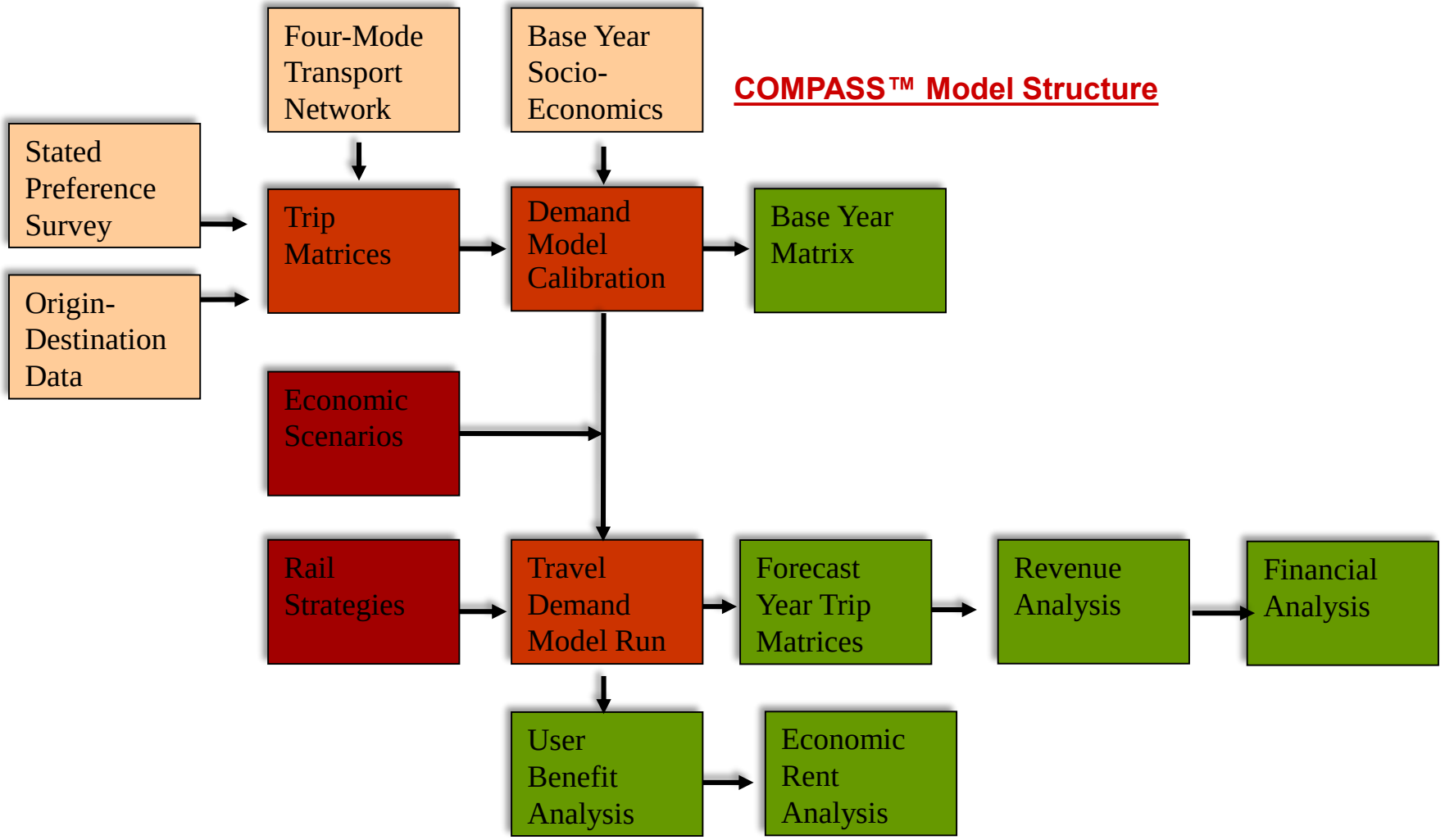
The Interactive Analysis is designed to develop the most efficient and effective alternatives for passenger rail service in the Toledo-Detroit Corridor. In these tasks, ridership and revenue are assessed against infrastructure needs and costs, and operating requirements and costs.

- To effectively predict the change pattern and overall rail travel demand levels for new rail systems, models are needed that can accurately forecast the impact of trip making increases and the role of the rail mode.
  - Evaluation of Alternatives
  - Operating and Capital Costs



Task 4: Estimate Demand and Future Demand for Service

We will use Investment Grade Methodology



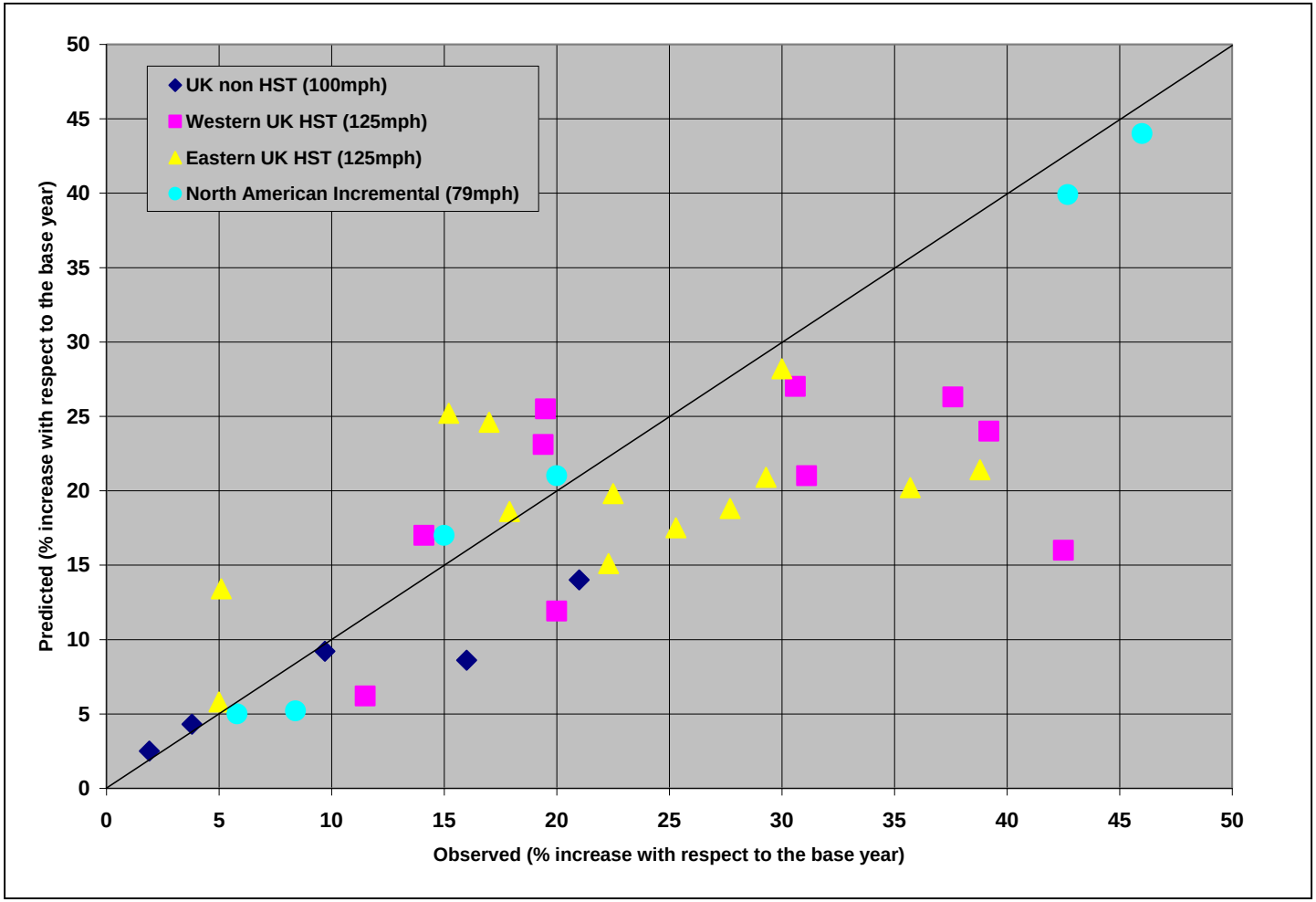
Task 5: Market Analysis and Transportation Database

Database: The market database will consist of four components:

1. **Origin / Destination Data** – Traffic movements by mode and purpose (business, commuter, special interest, tourist).
2. **Socioeconomic Data** – Population, Employment and Income by zone.
3. **Network Data** – Comprehensive modal networks will be developed for each mode of intercity travel (auto, rail and bus).
4. **Stated Preference Data** – The data will be derived from recent high speed rail surveys completed by TEMS in Chicago-Detroit EIS, and the Ann Arbor Traverse City Corridor Study.

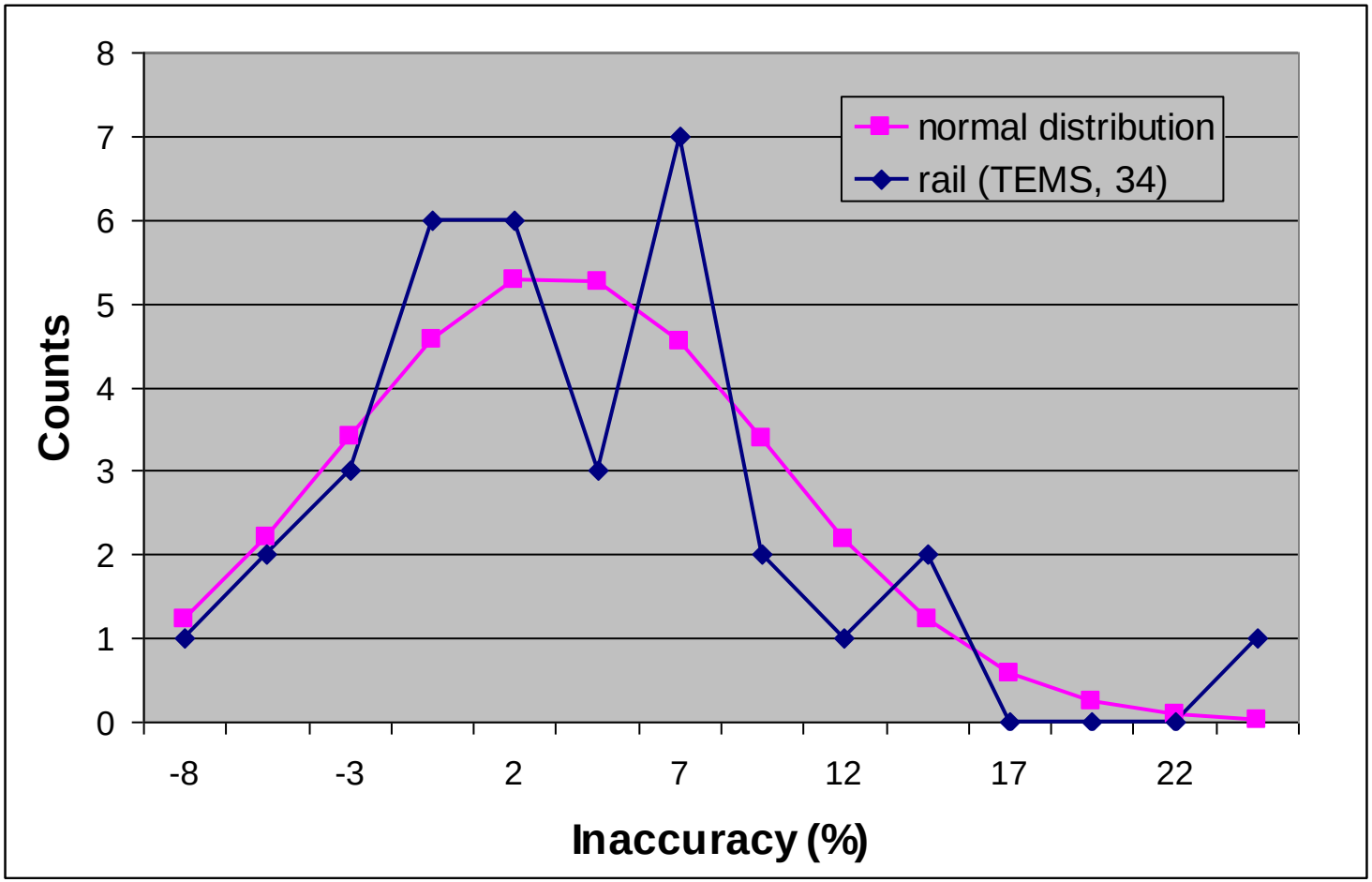
Task 5: Estimate Demand and Future Demand for Service

Observed vs. Predicted in TEMS' Rail Projects



Task 5: Estimate Demand and Future Demand for Service

Distribution of TEMS Forecast Error



Task 6: Operating Costs

We will estimate Rail Operating Costs

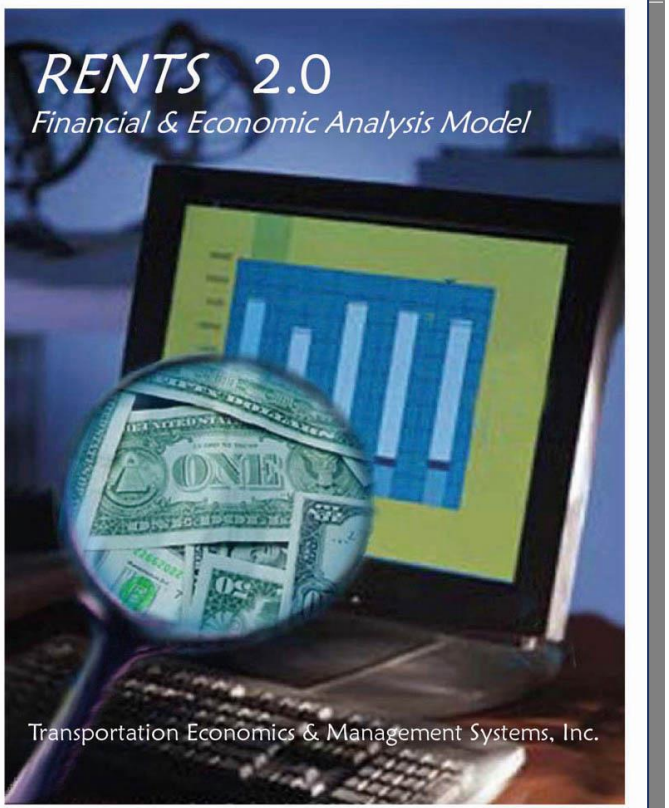
Framework resulted from previous multi-year, multi-state planning efforts (e.g., MWRRI and Florida Business Plans).

Drivers		Cost Categories
Train Miles	→	Equipment Maintenance Energy & Fuel Train & Engine Crews OBS Crews Operator Profit
Passenger Miles	→	Insurance Liability
Ridership[1]	→	Sales & Marketing Station Costs
Fixed Cost	→	Service Administration Track & ROW Maintenance Feeder Bus

[1]Station costs as well as sales and marketing are only affected weakly by ridership, so these two costs can be considered fixed for practical purposes.

Task 7: Preliminary Economic and Financial Analyses

RENTS™ will determine what technology and routes are financial and economically feasible and meet FTA/FRA requirements



RENTS™ uses output from the **COMPASS™** Demand Forecasting System to estimate the financial and economic benefits of a project:

- Financial return (Operating Ratio, NPV and IRR)
- Economic return (Gross and Net Consumer Surplus, NPV, and Cost-Benefit Ratio), and
- Economic Rent (Community benefits, such as changes in household income, employment by sector, property values, and population) that result from infrastructure and technology improvements or timetable and fare modifications.

Task 7: Preliminary Financial and Economic Feasibility Analyses

We will provide Pro forma Financial Analysis Of Cash Flows

Duluth Corridor Example

Exhibit 7.7 Minneapolis to Duluth 110-mph Rail Service: 8-Train Base Plan - Preliminary Operating Statement

Thousands of 2006 $	Total to 2040	2012	2013	2014	2015	2016	2017
Revenues							
Ticket Revenue	**$1,080,230**	$13,567	$25,107	$28,659	$29,422	$30,185	$30,948
On Board Services	**$86,418**	$1,085	$2,009	$2,293	$2,354	$2,415	$2,476
Express Parcel Service (Net Rev)	**$54,011**	$678	$1,255	$1,433	$1,471	$1,509	$1,547
Total Revenues	**$1,220,660**	$15,331	$28,371	$32,385	$33,247	$34,109	$34,971
Train Operating Expenses							
Energy and Fuel	**$75,081**	$2,013	$2,013	$2,013	$2,013	$2,013	$2,013
Train Equipment Maintenance	**$204,890**	$5,494	$5,494	$5,494	$5,494	$5,494	$5,494
Train Crew	**$96,367**	$3,323	$3,323	$3,323	$3,323	$3,323	$3,323
On Board Services	**$80,631**	$1,833	$2,295	$2,437	$2,467	$2,498	$2,528
Service Administration	**$147,171**	$5,075	$5,075	$5,075	$5,075	$5,075	$5,075
Total Train Operating Expenses	**$604,139**	$17,738	$18,200	$18,342	$18,372	$18,403	$18,434
Other Operating Expenses							
Track & ROW Maintenance	**$114,663**	$3,954	$3,954	$3,954	$3,954	$3,954	$3,954
Station Costs	**$40,547**	$1,398	$1,398	$1,398	$1,398	$1,398	$1,398
Sales & Marketing	**$51,009**	$643	$1,190	$1,358	$1,394	$1,429	$1,465
Insurance Liability	**$43,345**	$549	$1,015	$1,158	$1,188	$1,218	$1,248
Total Other Operating Expenses	**$249,564**	$6,544	$7,557	$7,868	$7,934	$7,999	$8,065
Total Operating Expenses	**$853,703**	$24,283	$25,757	$26,210	$26,306	$26,402	$26,498
Cash Flow From Operations	**$366,957**	($8,952)	$2,614	$6,175	$6,941	$7,707	$8,473
Operating Ratio	**1.43**	0.63	1.10	1.24	1.26	1.29	1.32

Task 8: Financing and Funding Analysis
Preliminary Financial and Economic Feasibility Analyses

We will measure USDOT FRA approved economic benefits

MWRRS Example

Benefits	Billions in 1998 dollars
MWRRS User Benefits	
Consumer Surplus	$6.4
(e.g., time savings expressed as dollars)	
System Revenues	$6.8
Other Mode User Benefits	
Airport Congestion Relief	0.7
Highway Congestion Relief	1.3
Resource Benefits	
Air Carrier Operating Cost Reductions	0.4
Emission Reductions	0.3
Total Benefits	$15.9
Costs	
Capital	$4.1
Financing	0.2
Operating and Maintenance	5.0
Total Costs	$9.3
Ratio of Benefits to Costs	1.7

Task 8: Estimates for Community Benefits for the Corridor*

Duluth Corridor Example

Economic Rent Factor	110/4	125/4	110/8	125/8
State of Minnesota:				
Employment (# productivity jobs)	5,647	6,409	13,114	13,876
Income (2006$)	$252 mill	$285 mill	$583 mill	$616 mill
State Income Tax 2006$)	$10.6 mill	$12.0 mill	$24.5 mill	$25.9 mill
Federal Income Tax (2006$)	$28.5 mill	$32.3 mill	$66.0 mill	$69.7 mill
Property Value (2006$)	$722 mill	$817 mill	$1,672 mill	$1,767 mill
Property Tax (2006$)	$ 8.4 mill	$ 9.5 mill	$ 19.5 mill	$ 20.6 mill
Average Household Income (2006$)	$167	$189	$384	$406
State of Wisconsin:				
Employment (# productivity jobs)	305	351	719	765
Income (2006$)	$15 mill	$17 mill	$34 mill	$37 mill
State Income Tax (2006$)	$0.5 mill	$0.6 mill	$1.2 mill	$1.3 mill.
Federal Income Tax (2006$)	$1.5 mill	$1.7 mill	$3.5 mill	$3.8 mill
Property Value (2006$)	$45 mill	$52 mill	$106 mill	$113 mill
Property Tax (2006$)	$ 0.8 mill	$ 0.9 mill	$ 1.8 mill	$ 2.0 mill
Average Household Income (2006$)	$102	$117	$240	$255

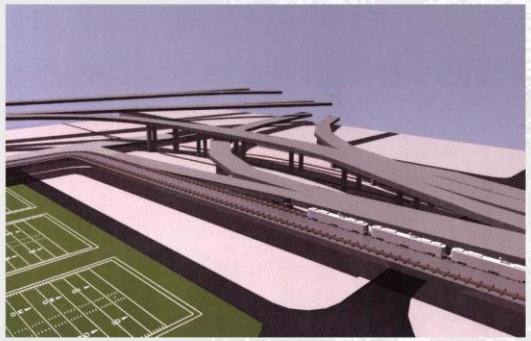
***Community Benefits will be estimated if additional funding is provided.**

Task 8: Community Benefits would Include Property Development at Stations

Cincinnati Development Example

Southeast Corner

East View



Joint Development Potential = $450 Million

Task 9: Implementation Plan

We will develop an Implementation Plan similar to that of the Midwest and Ohio studies

Ohio-Cleveland Hub	$ 1000's of 2002$)	Year1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
3-C Corridor	$1,090,801		PE	Final Design		Construction		Operation			
Cleveland-Detroit	$387,101		PI	PE		Final Design	Construction		Operation		
Cleveland-Pittsburgh	$487,624			PI	PE		Final Design	Construction		Operation	
Cleveland-Toronto	$803,996				PI	PE		Final Design		Construction	Operation

Total Investment Costs by Year		Year1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Planning and Implementation (PI)	$173,095	$68,175	$24,194	$30,477	$50,250						
Preliminary Engineering (PE)	$242,333	$15,908	$69,275	$45,600	$45,815	$54,011	$11,725				
Final Design	$276,952			$54,540	$73,895	$43,736	$64,581	$40,200			
Construction	$2,077,142				$102,263	$445,341	$497,665	$367,106	$438,643	$226,124	
Total Infrastructure	$2,769,522	$84,083	$93,469	$130,616	$272,222	$543,088	$573,971	$407,306	$438,643	$226,124	
Total Land	$233,209				$70,756	$57,930	$47,351	$57,172			
Total Rolling Stock	$322,000						$80,500	$80,500	$80,500	$80,500	
Total Investment	$3,324,731	$84,083	$93,469	$130,616	$342,978	$601,018	$701,822	$544,977	$519,143	$306,624	

Key to Implementation Stages	Key to Operation Phases:
Project Development	Phase 1
Preliminary Engineering	Phase 2
Final Design	Phase 3
Construction	Phase 4

Task 10: Business Plan

- Database Development
- Ridership and Revenue Forecasts
- Corridor Engineering and Environmental Review
- Operating Schedules and Timetables
- Implementation Plan
- Financial/Funding Plan

THANK YOU.