Iowa City-Cedar Rapids Passenger Rail Conceptual Feasibility Study Final Study

October
2015

Contents

Executive Summary

The purpose of the Iowa City-Cedar Rapids Passenger Rail Conceptual Feasibility Study is to examine the conceptual feasibility of a passenger rail service operating between Iowa City, Iowa, and Cedar Rapids, Iowa. The corridor under consideration in this study is the Cedar Rapids & Iowa City Railway (CRANDIC), an active freight railroad over which no passenger rail services are offered at present. The 20.5-mile CRANDIC Corridor Study Area (the Corridor) is between Gilbert Street in central Iowa City, Iowa, and the Eastern Iowa Airport in Cedar Rapids, Iowa.

CRANDIC and the Iowa Department of Transportation (Iowa DOT) selected HDR as its consultant team for the study. The railroad, Iowa DOT, and other project stakeholders participated in the study through coordination with HDR.

The study was divided into the following tasks, which culminated in this study report:

- **Background** – Describe the background of the passenger rail study.
- **Prior Studies** – Provide a high-level assessment of prior studies of the Corridor's passenger rail feasibility, service territory, and transit and ridership potential.
- **Existing Corridor Conditions** – Describe the existing conditions and infrastructure on the Corridor.
- **Potential Corridor Passenger Rail Service Characteristics** – Describe the general characteristics of the modes of passenger rail service available and their applicability to the Corridor.
- **Conceptual Cost Estimate** – Develop representative conceptual capital and operations and maintenance costs for each mode of passenger rail service assessed for potential implementation on the Corridor.
- **Environmental Review** – Describe the general Environmental Review process for constructing and implementing passenger rail service.
- **Federal Safety and Governance Regulatory Requirements** – Describe the basic federal regulatory requirements for the implementation of passenger rail service.
- **Funding Availability Assessment** – Describe the general federal funding streams and availability for each mode of passenger rail service.

Applicability of Modes to the Corridor

Three passenger rail modes in use on other passenger rail corridors across the U.S. were studied and analyzed for potential applicability to the CRANDIC Corridor and are described in detail later in this study. These modes are:

- Streetcar
- Light Rail Transit
- Commuter Rail Transit

The applicability of each mode to the Corridor took into account the following considerations:

- Typical service range
- Typical average capacity per vehicle
- Typical station spacing
- Maximum and average operating speeds
- Typical service frequency
- Typical technology characteristics
- Typical corridor and infrastructure requirements
- Typical capital costs for service implementation
- Typical annual operations and maintenance costs

The streetcar mode typically uses a variety of small vehicles and tends to operate like a downtown people mover linking downtown visitors, employees, and residents to jobs, shopping, and entertainment. Electrified streetcar networks characteristically operate over short distances (typically 4 miles or less), provide service every 5-15 minutes, and operate within city streets in urban areas. The typical average capacity per vehicle is 60 passengers. Maximum speeds are typically up to 35 mph.

The Light Rail Transit (LRT) mode is typically a single vehicle type operating over an electrified network in a traffic lane or exclusive right-of-way. The typical operating range for an LRT is up to 20 miles and service is typically provided every 5-15 minutes. In some cases, LRT operations can share track with an active freight railroad, but only if the two modes are temporally separated (e.g., LRT operates during daylight, freight at night). The typical average capacity per vehicle is 225 passengers. The power supply that allows the rapid accelerating and longer distance operating performance typical of the LRT requires overhead catenary and traction power substations, which have a significant cost to build, operate, and maintain. Maximum speeds are typically 45-65 mph.

Commuter Rail Transit (CRT) typically employs either push-pull diesel locomotive powered commuter trains or self-propelled Diesel Multiple Unit (DMU) trains. The typical operating range for CRT is up to 50 miles and service is typically provided every 30 or more minutes. The typical average capacity per vehicle or train is between 250 and 1,000 passengers. The type and intensity of land uses in the Corridor suggest a passenger rail service with fairly long station spacing and peak period focused service, a service pattern that is characteristic of CRT. DMU trains are versatile and typically offer performance characteristics suitable to likely station spacing in the Corridor and they provide a suitable capacity, flexibility to expand train length as necessary, and potential for use on city streets in downtown areas, if required. Maximum speeds are typically up to 79 mph.

Potential Implementation and Operating and Maintenance Costs

A detailed cost estimate was not performed due to the limited nature of the study. Instead, costs were obtained by extracting costs from other streetcar, LRT, and CRT corridors recently implemented in the U.S. These costs were adjusted for the length of corridor, potential number of stations, frequency of service, and other attributes specific to the Corridor. The findings of the technical work described above and the development of the conceptual cost estimate by mode undertaken for this study are summarized in Figure ES-1 below. The study determined that the lowest cost option for implementation of passenger rail service on the CRANDIC Corridor between Iowa City and the Eastern Iowa Airport at Cedar Rapids is the Commuter Rail Transit (CRT) mode. Probable corridor implementation costs would vary depending on the number of stations, the length of the corridor, and the frequency of service. Savings could potentially be realized by reducing the number of stations, frequency of service, passenger capacity, and maximum speeds.

The probable capital cost for implementation based on other recently implemented corridors would be expected to range from $250 million to $520 million, and annual operations and maintenance costs would be expected to range between $5.6 million and $6.7 million, in 2015 dollars, as shown in Figure ES-1 below.

Figure ES-1. Conceptual Cost Summary for Passenger Rail Implementation on CRANDIC Corridor

ATTRIBUTES AND MODE	STREETCAR	LIGHT RAIL TRANSIT	COMMUTER RAIL TRANSIT
Potential Capital Cost to Implement Passenger Rail Service on the CRANDIC Corridor	$1.07 - $1.64 billion	$860 million - $1.33 billion	$250 million - $520 million
Potential Annual Operations and Maintenance Cost on the CRANDIC Corridor	$5.6 million - $6.7 million	$5.6 million - $6.7 million	$5.6 million - $6.7 million

Phased implementation of passenger rail service in the CRANDIC Corridor could be considered by stakeholders based upon need for the service and the availability of funding. Passenger rail service could be phased geographically to reduce the initial cost of service implementation. The cost to implement a Commuter Rail Transit (CRT) mode of passenger rail operation over the 9.5-mile Iowa City-North Liberty segment of the Corridor in a potential first phase, for example, are anticipated to range from $114 million to $238 million in capital costs and between $2.6 million and $3.1 million annually in operations and maintenance costs. The acquisition of reconditioned secondhand CRT equipment, if available, could also potentially lower the capital cost for procurement of equipment. Capital costs could potentially be reduced further by decreasing the number of stations or by phasing the implementation of stations and station amenities and the construction of a new layover and maintenance facility where trains would be stored and maintained between scheduled operations.

Next Steps

Project stakeholders will determine the feasibility of further study of the potential for implementation of passenger rail service on the Corridor. More detailed future analysis and study could include ridership and revenue forecasts, more detailed cost estimates, financial plan, conceptual operating and phasing plans, conceptual station designs and infrastructure engineering, environmental fatal-flaws analysis and screening, and the potential for phased implementation of passenger rail service.

1. Background

The Iowa City-Cedar Rapids Passenger Rail Conceptual Feasibility Study will examine the conceptual feasibility of a passenger rail service operating in the corridor between Iowa City, Iowa, and Cedar Rapids, Iowa. The corridor under consideration in this study uses the Cedar Rapids & Iowa City Railway (CRANDIC). The CRANDIC Corridor Study Area (the Corridor) is between Gilbert Street in central Iowa City, Iowa, and the Eastern Iowa Airport in Cedar Rapids, Iowa, a total of 20.5 miles.

Project stakeholders are the public and private entities that funded this feasibility study:

- Cedar Rapids & Iowa City Railway (CRANDIC)
- Iowa Department of Transportation (Iowa DOT)
- Metropolitan Planning Organization of Johnson County, Iowa (MPOJC)
- Johnson County, Iowa
- City of Iowa City, Iowa
- City of Coralville, Iowa
- City of North Liberty, Iowa
- University of Iowa

The goal of this study is to enable project stakeholders of the proposed passenger service to understand the different modes that are available for passenger rail service in the Corridor; to understand the probable capital and operating and maintenance costs of each of the modes; and to consider service frequencies, service capacities, and the regulatory and funding environment for implementing a passenger rail service in the Corridor. The modes of passenger rail service that are currently available are assessed in this study for their conceptual feasibility for the Corridor alignment, potential stations, other uses of the existing railroad, and the passenger transportation vision for the Corridor. These modes include:

- Streetcar, electrified
- Light Rail Transit (LRT), electrified
- Commuter Rail Transit (CRT), using either push-pull diesel locomotive powered commuter trains, or self-propelled Diesel Multiple Unit (DMU) trains

More detailed analysis and study for potential implementation of passenger rail services on in the Corridor, including ridership and revenue forecasts, detailed cost estimates, financial plan, conceptual operating and phasing plan, conceptual station designs and engineering, environmental fatal-flaws analysis and screening, and the potential implementation of passenger rail service over an existing CRANDIC route or an alternate route between the Eastern Iowa Airport at Cedar Rapids and downtown Cedar Rapids, may be explored by project stakeholders in future study phases.

2. Prior Studies

Two prior transit studies have been completed for the Iowa City-Cedar Rapids travel corridor, which includes the CRANDIC Corridor, in the last decade:

- Cedar-Iowa River Rail Transit Project Feasibility Study, 2006
- Iowa Commuter Rail Transportation Study, 2014

These studies are summarized below.

2.1 Cedar-Iowa River Rail Transit Project Feasibility Study

The Cedar-Iowa River Rail Transit Project Feasibility Study focused upon passenger rail options using several regional and short line railroad rights-of-way, primarily linking Iowa City and Cedar Rapids. The study considered:

- Infrastructure requirements and capital costs
- Service plan and potential conflicts
- Potential ridership
- Federal funding opportunities

The alignment most applicable to this study is the CRANDIC Corridor extending north from Iowa City through the University of Iowa campus and passing by the Eastern Iowa Airport in Cedar Rapids en route to downtown Cedar Rapids. The southern portion of the route could potentially serve a southbound commuter market from North Liberty and Coralville to the University of Iowa campus and downtown Iowa City. Significant freight movements north of the Eastern Iowa Airport would make passenger service difficult to implement to downtown Cedar Rapids. The Eastern Iowa Airport could offer a reverse commute market, however, providing a destination anchor at the north end.

Within this corridor, the report provided information for both options, offering a commuter option from the northern suburbs of North Liberty and Coralville to Iowa City, or the larger scale project extending to the Eastern Iowa Airport at Cedar Rapids. The capital and operating costs in 2006 dollars and estimated ridership for the two options are summarized in Table 1 below.

Table 1. Summary Service Statistics

	CAPITAL COSTS					
SERVICE	TRACK/ BRIDGES	EQUIPMENT (PURCHASED OR LEASED)	STATIONS & LAYOVER FACILITIES	TOTAL	RIDERSHIP	ANNUAL OPERATING COSTS
N. Liberty – Iowa City Commuter Service (2006)	$1,448,000	$8,400,000	$8,800,000	$18,648,000	742	$4,078,000
N. Liberty – Iowa City Commuter Service (2030)	$6,615,000	$12,600,00	$8,800,000	$28,015,000	1,336	$6,797,000
Eastern Iowa Airport to Iowa City Commuter Service (2006)	$4,107,000	$4,500,000	$12,800,000	$21,407,000	837	$5,014,000
Eastern Iowa Airport to Iowa City Commuter Service (2030)	$14,981,000	$7,500,000	$12,800,000	$35,281,000	1,991	$11,960,000

The capital cost allowed for CRANDIC to require rail replacement prior to initiating 30 mph service. Any of these alternatives require a significant capital investment. The operating costs are also significant, and increase substantially in response to ridership growth. The annual operating costs are particularly important in that they tend to grow over time, and generally require a 60-75 percent subsidy.

The ridership forecasts shown in the table above are based upon existing and projected travel flows in the region, and characteristics of the proposed services. The longer route extending to the Eastern Iowa Airport generates somewhat higher ridership as would be expected. In many markets, the airport service can be more of a benefit to the airport employees than airport passengers. In general, these ridership levels are not substantial. Modern commuter rail projects, excluding the legacy systems such as in Boston, Massachusetts, and Chicago, Illinois, typically generate 2,000-5,000 trips per day. Light Rail Transit (LRT) projects usually carry 20,000 daily passengers or more.

The report also identifies the benefits of transit-oriented development (TOD) to potential ridership. TOD development tends to be higher density with mixed-uses not permitted by traditional zoning codes. In addition, the development is more pedestrian oriented than typical suburban patterns, increasing the number of trips that can be made without motorized vehicles. This development pattern is particularly successful in generating transit riders in large urban areas with high frequency rail service proximate to the development.

The report identified several potential federal funding approaches. At the time of the report, there was some opportunity to pursue federal funding under an "exempt" status for a project requesting under $25 million. That option is no longer available. The Small Starts program identified later in the report has been further developed by the Federal Transit Administration (FTA) for projects requesting less than $75 million in capital funding. The FTA requirements are less robust than for the larger New Starts projects, but remain significant.

Projects with lower daily ridership and longer passenger trips typical of corridors of this nature generally do not perform well under the FTA criteria. This report does not explicitly evaluate the potential for federal funding of a project. It suggests, however, that some type of excursion service would be much easier to implement than a regular commuter service.

2.2 Iowa Commuter Rail Transportation Study

The Iowa legislature directed the Iowa Department of Transportation (Iowa DOT) to conduct a study that would identify the existing and future commuter needs in the Interstate 380 Corridor between Cedar Rapids and Iowa City and determine the viability of various commuter transportation improvements to address those needs. The study relied heavily upon input from major employers in the Cedar Rapids-Iowa City study area and the results of two public surveys that produced nearly 1,000 responses from study area commuters.

The U.S. Census Bureau American Community Survey 2006-2010 five-year samples indicated a daily commuter market in the Cedar Rapids-Iowa City corridor of about 7,500 daily commuters. Over 90 percent of the commuter survey respondents indicated that transportation improvements were necessary in the corridor. About 70 percent indicated that they would consider use of a public bus for their commute.

A wide range of transit options were considered to address commuting needs in the corridor. Based upon the prior Cedar-Iowa River Rail Transit Project Feasibility Study described above, commuter rail service was not considered for short-term implementation due to the capital and operating costs. The study recommended a package of transit improvements, including:

- Public interregional express bus service connecting Cedar Rapids, North Liberty, Coralville, and Iowa City.
- Subscription bus service tailored to specific markets.
- Public vanpools using vehicles supplied by public agencies and driven by one of the vanpool members.
- Public carpool program using one of the individual's private automobile.

In addition to these services, the report recommended a package of infrastructure and technology improvements to enhance the effectiveness of the various service improvements. That package includes:

- Park and ride facilities at convenient locations proximate to the primary commuting corridor, for use by bus, van, and carpool passengers.
- Regional commuter travel information providing comprehensive, local travel information such as routing, pick up points, and fares.

- Transit priority measures that make transit and ridesharing options more attractive by reducing travel time and improving service reliability.
- Guaranteed Ride Home that offers a convenient, affordable transportation alternative in case of an emergency outside of scheduled transportation provided by all modes.

The report indicated that this combination of services and supporting infrastructure can be implemented in the short term in order to significantly expand and enhance transportation options within the I-380 corridor.

3. Existing Corridor Conditions

This section describes existing conditions of the Corridor, including the condition of the CRANDIC infrastructure, demographics and geographic characteristics of the service area, and other transportation infrastructure and services. It includes a brief history of previous passenger rail transportation services in the Corridor.

3.1 Corridor Service Area, Intersections, and Connectivity

The CRANDIC Corridor connects Iowa City in Johnson County and Cedar Rapids in Linn County – two of the State of Iowa's fastest growing metropolitan areas. According to U.S. Census data, the Iowa City and Cedar Rapids Metropolitan Statistical Areas were estimated to have a combined population of 428,242 as of July 1, 2014.[1]

The north-south CRANDIC Corridor, and the parallel Interstate Highway 380 Corridor, sit astride growing residential, commercial, and light industrial development – particularly in Iowa City, Coralville, and North Liberty.

The CRANDIC Corridor intersects with:

- **Universities and Colleges** – including the University of Iowa in Iowa City and Kirkwood Community College in Cedar Rapids.
- **Hospitals** – including the University of Iowa Hospitals and Clinics, Iowa City Veterans Administration Hospital, and Mercy Hospital in the Iowa City area.
- **Airport** – including access to the Eastern Iowa Airport in Cedar Rapids.
- **Shopping Destinations** – including downtown Iowa City, the Iowa River Landing in Coralville, and Coral Ridge Mall in Coralville.
- **Recreation** – including University of Iowa sporting and cultural events, and access to parks and multi-use trails.
- **Employment** – including access to several major area employers.

A passenger service in the CRANDIC Corridor could potentially relieve vehicular congestion and improve traffic safety on parallel Interstate 380 between Iowa City and Cedar Rapids, and also provide a transportation alternative to driving for students, workers, business and leisure travelers, retail shoppers, the elderly, and hospital patients. In 2014, it was estimated that over 7,500 commuters traveled between the Cedar Rapids and Iowa City metropolitan areas daily, and that most of these commuters were using Interstate 380 during peak travel periods.[2] A passenger rail service in the CRANDIC Corridor could also reduce travel times and provide a transportation alternative for area commuters who drive to Iowa City and the University of Iowa facilities from Coralville, Oakdale, North Liberty, and other outlying locations. Many of these commuters are presently transit dependent, as they drive to Iowa City and park their vehicles in parking lots and then continue their commute on local transit buses.

Passenger rail service on the CRANDIC could also potentially provide intermodal connectivity with existing and future rail, transit, bus, and air services in the region as described below.

Intercity Passenger Rail – Implementation of a twice-daily intercity passenger rail service between Chicago and Moline, Illinois, and Iowa City is presently under study by Iowa DOT and the Illinois Department of Transportation (Illinois DOT). Passenger rail service on CRANDIC could potentially terminate at Clinton Street, one block south of a potential Iowa City station for the intercity passenger rail service, which would provide a transfer point between the two services.

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[1] U.S. Census, Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2014 – United States – Metropolitan Statistical Area; 2014 Population Estimates; U.S. Census website (http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk); July 31, 2015
[2] Iowa Commuter Transportation Study; Iowa Department of Transportation, December 2014
[3] Ibid

Public Transit – Passenger rail service on the CRANDIC could potentially provide access to and enhance existing and future connecting public transit systems in the Corridor. Potential connections could be made with Iowa City Transit buses at Iowa City; University of Iowa CAMBUS network at Iowa City; Coralville Transit buses at North Liberty, Coralville, and Iowa City; and Cedar Rapids Transit buses at the Eastern Iowa Airport in Cedar Rapids.[3]

Intercity Buses – Burlington Trailways and Greyhound serve the Court Street Transportation Center on Court Street in downtown Iowa City, which is located in close proximity to the CRANDIC Corridor.

Airport – The CRANDIC Corridor is in close proximity to the terminal of the Eastern Iowa Airport on the south side of Cedar Rapids. A surface pedestrian connection or shuttle bus service could potentially be established between a rail station on the Corridor and the Eastern Iowa Airport. The Airport presently hosts several daily domestic flights for Allegiant Air, American Eagle, Delta Airlines, Frontier Airlines, and United Airlines. According to statistics from the Eastern Iowa Airport, approximately 1,132,991 passengers used the airport during 2014.[4]

3.2 Corridor History

The Cedar Rapids & Iowa City Railway (CRANDIC) Corridor was constructed as a high-speed interurban between its namesake cities by the Iowa Railway & Light Company during 1903 and 1904. The railroad provided electrified passenger and freight service over the 27 miles between Cedar Rapids and Iowa City starting on August 13, 1904.[5] Figure 1 below shows the standard of track construction and style of passenger equipment employed when the railroad began operations.

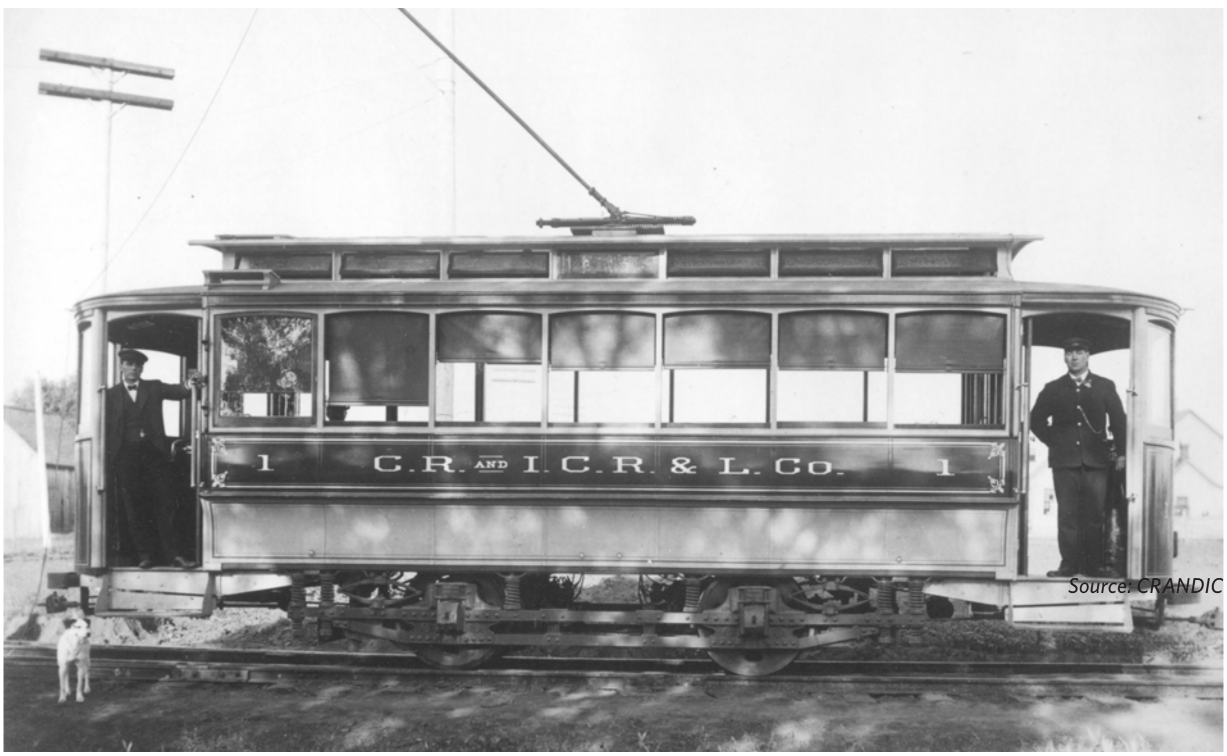

Figure. 1 Early Interurban Car on the CRANDIC

The map in Figure 2 below shows the route of the CRANDIC Corridor and its proximity to other railroad lines in the region today. The bold red line identifies the CRANDIC Corridor Study Area between Iowa City and the Eastern Iowa Airport in Cedar Rapids.

[4] *The Eastern Iowa Airport CY Total Passengers 2014; Eastern Iowa Airport website; www.eiairport.org; July 27, 2015*
[5] *Cedar Rapids & Iowa City Railway (CRANDIC) website; www.crandic.com; July 27, 2015*

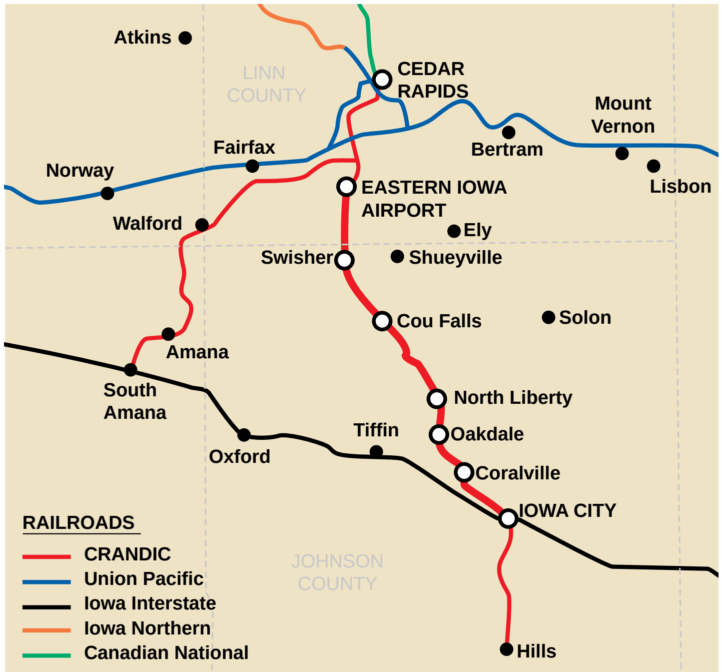

Figure 2. CRANDIC Corridor Between Cedar Rapids and Iowa City *Source: HDR*

The height of CRANDIC interurban operations began when the railroad upgraded its passenger car fleet in 1939, via the acquisition of second-hand high-speed electric interurban cars. These cars proved capable of providing faster and more efficient interurban service over the Corridor, and attracted record ridership.[6] Figure 3 below shows a high-speed interurban car at Swisher that supported the enhanced passenger operation.

Figure 3. High-Speed Interurban Car on the CRANDIC at Swisher *Source: CRANDIC (William D. Middleton)*

[6] *Ibid*

By 1944, CRANDIC operated 17 interurbans each way daily, which provided almost hourly service between Cedar Rapids and Iowa City, from approximately 5 a.m. until 12 midnight. In 1945, CRANDIC reached the zenith of ridership carrying a record 573,307 patrons.[7] Figure 4 below shows CRANDIC's station locations and frequent passenger service offerings in the Corridor, as they existed in October 1946.

CEDAR RAPIDS TO IOWA CITY

SOUTHBOUND—READ DOWN

	2 Dly AM	4 ExS AM	6 Dly AM	8 Dly AM	10 Dly AM	12 Dly AM	14 Dly PM	16 Dly PM	18 Dly PM	20 Dly PM	22 Dly PM	24 Dly PM	26 Dly PM	28 Dly PM	30 Dly PM	32 Dly PM	34 Dly AM
Cedar Rapids Lv	4 40	5 50	6 45	7 50	10 00	11 00	12 01	1 00	2 00	3 00	4 00	5 15	6 15	7 45	9 00	10 05	12 01
Crandic	4 46	5 56	6 51	7 56	10 05	11 06	12 07	1 06	2 06	3 06	4 06	5 21	6 21	7 51	9 06	10 10	12 05
Hawkeye Downs	4 50	6 00	6 57	8 02	10 10	11 11	12 12	1 11	2 11	3 11	4 11	5 26	6 26	7 56	9 11	10 15	12 10
Waconia	4 51	6 01	6 58	8 04	10 11	11 12	12 13	1 12	2 12	3 12	4 12	5 27	6 27	7 57	9 12	10 16	12 11
Konigsmark	4 56	6 06	7 02	8 08	10 15	11 17	12 18	1 17	2 17	3 17	4 17	5 32	6 32	8 01	9 16	10 20	12 15
Swisher	5 00	6 10	7 07	8 12	10 19	11 22	12 23	1 22	2 22	3 22	4 22	5 37	6 37	8 05	9 20	10 24	12 19
Cou Falls	5 03	6 13	7 10	8 16	10 22	11 25	12 26	1 25	2 25	3 25	4 25	5 40	6 40	8 08	9 23	10 27	12 22
North Liberty	5 13	6 23	7 22	8 27	10 32	11 35	12 35	1 35	2 35	3 35	4 35	5 50	6 50	8 18	9 33	10 37	12 32
Oakdale	5 16	6 26	7 26	8 31	10 36	11 39	12 39	1 39	2 39	3 39	4 39	5 54	6 54	8 22	9 37	10 41	12 36
Coralville	5 21	6 31	7 31	8 36	10 41	11 44	12 44	1 44	2 44	3 44	4 44	5 59	6 59	8 27	9 42	10 46	12 41
Iowa City—*Yards*	5 25	6 35	7 35	8 40	10 45	11 48	12 48	1 48	2 48	3 48	4 48	6 03	7 03	8 31	9 46	10 50	12 45
Iowa City—*Passenger Station* Ar	5 30	6 40	7 40	8 45	10 50	11 52	12 52	1 52	2 52	3 52	4 52	6 07	7 07	8 35	9 50	10 55	12 50

Ship via the *CRANDIC ROUTE . . .*

Through freight service in connection with ALL railroads.

TO PASSENGERS: In the interest of safety please do not ride in the front vestibule of car or converse with the engineer.

IOWA CITY TO CEDAR RAPIDS

NORTHBOUND—READ DOWN

	1 Dly AM	3 ExS AM	5 Dly AM	7 Dly AM	9 Dly AM	11 Dly PM	13 Dly PM	15 Dly PM	17 Dly PM	19 Dly PM	21 Dly PM	23 Dly PM	25 Dly PM	27 Dly PM	29 Dly PM	31 Dly PM	33 Dly AM
Iowa City—*Passenger Station* Lv	5 35	6 45	7 50	9 30	11 00	12 01	1 00	2 00	3 00	4 00	5 15	6 15	7 15	9 05	10 00	11 00	12 55
Iowa City—*Yards*	5 40	6 49	7 55	9 35	11 05	12 06	1 05	2 05	3 05	4 05	5 20	6 20	7 21	9 10	10 06	11 05	1 00
Coralville	5 44	6 53	7 59	9 39	11 09	12 10	1 09	2 09	3 09	4 09	5 24	6 24	7 26	9 14	10 10	11 09	1 04
Oakdale	5 50	6 58	8 05	9 44	11 14	12 15	1 14	2 14	3 14	4 14	5 29	6 29	7 31	9 19	10 15	11 14	1 09
North Liberty	5 56	7 02	8 09	9 48	11 18	12 19	1 18	2 18	3 18	4 18	5 33	6 33	7 35	9 23	10 19	11 18	1 13
Cou Falls	6 06	7 10	8 16	9 56	11 25	12 26	1 25	2 25	3 25	4 25	5 40	6 40	7 42	9 30	10 27	11 25	1 20
Swisher	6 10	7 14	8 21	10 00	11 29	12 30	1 29	2 29	3 29	4 29	5 44	6 44	7 46	9 34	10 31	11 29	1 24
Konigsmark	6 14	7 18	8 25	10 04	11 33	12 34	1 33	2 33	3 33	4 33	5 48	6 48	7 50	9 38	10 35	11 33	1 28
Waconia	6 18	7 22	8 29	10 09	11 38	12 38	1 38	2 38	3 38	4 38	5 53	6 53	7 55	9 43	10 40	11 37	1 32
Hawkeye Downs	6 19	7 23	8 30	10 10	11 39	12 39	1 39	2 39	3 39	4 39	5 54	6 54	7 56	9 44	10 41	11 41	1 36
Crandic	6 24	7 28	8 34	10 14	11 43	12 43	1 43	2 43	3 43	4 43	5 58	6 58	8 00	9 48	10 45	11 45	1 40
Cedar Rapids Ar	6 30	7 35	8 40	10 20	11 50	12 50	1 50	2 50	3 50	4 50	6 05	7 05	8 05	9 55	10 50	11 50	1 45

A.M. TIME (12 00 night to 11 59 noon) is shown in light face type.
P.M TIME (12 00 noon to 11 59 night) is shown in **bold face type.**

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Figure 4. CRANDIC Passenger Service Timetable, October 1946 *Source: HDR*

Owing to the surging popularity of the automobile and the dominance of hard-surfaced roadways in the immediate post World War II era, CRANDIC ridership declined sharply to just 188,317 patrons in 1952. Passenger rail service was discontinued altogether on May 30, 1953, and abandonment of remaining interurban trackage in city streets and full dieselization of freight railroad operations soon followed.[8] The CRANDIC's freight service and network grew considerably in the ensuing years. In 2014, the short line railroad had 54 route miles and continued to provide direct access to several large industries and multiple connections with other railroads in the Cedar Rapids area. CRANDIC carried 99,334 carloads during 2014.

The CRANDIC's former interurban line – today known as CRANDIC Division 2 – once served as a primary artery for considerable volumes of freight rail traffic originating in Cedar Rapids that was interchanged to the Iowa Interstate Railroad (IAIS) at Iowa City for furtherance to the Quad Cities of Iowa and Illinois; Chicago and Peoria, Illinois; and Council Bluffs, Iowa. The interchange of freight rail traffic between the carriers was shifted from Division 2 and Iowa City, west to South Amana, Iowa, and over another CRANDIC line in 2001.

Today, the CRANDIC's former interurban line is used by CRANDIC to serve a considerable industrial base in south Cedar Rapids and one rail shipper in North Liberty. CRANDIC leased the former interurban line within central Iowa City, as well as its connecting line from Iowa City to Hills (former Chicago, Rock Island & Pacific Railroad trackage acquired in 1980) to IAIS in 2012. Present freight operations in the CRANDIC Corridor are described later in this section.

[7] *Ibid*
[8] *Ibid*

3.3 Present General Corridor Characteristics

The CRANDIC Corridor under consideration in this study includes the segment of CRANDIC Division 2 between Gilbert Street in central Iowa City (Milepost 25.8) and the Eastern Iowa Airport at Cedar Rapids (Milepost 5.3), for a total of 20.5 miles. This section contains an assessment of the present general characteristics and conditions of the CRANDIC Corridor, as observed in May 2015.

3.3.1 Timetable Stations

Timetable stations on CRANDIC Division 2 and their railroad milepost location within the CRANDIC Corridor are listed in Table 2 below.

Table 2. CRANDIC Division 2 Timetable Stations

TIMETABLE STATION	CRANDIC MILEPOST
Konigsmark (Eastern Iowa Airport in Cedar Rapids)	5.3
Airport Siding	6.1
Swisher	8.3
Cou Falls	10.6
Mid-River	13.3
North Liberty	16.7
Oakdale	19.8
Great Lakes	22.3
Coralville	22.9
Iowa City	25.1

Source: CRANDIC

3.3.2 Track Configuration

The CRANDIC Corridor is comprised of a single main track with sidings to accommodate meet-pass events between trains, switching of online freight customers, and to stage and store rail cars. Short sidings exist on the Corridor just outside the Study Area at Cedar Rapids, and within the Study Area at Airport Siding, Mid-River, North Liberty, Coralville, and Iowa City.

CRANDIC maintains yards for classifying, staging, and meeting trains on the Corridor just outside the Study Area at Cedar Rapids and within the Study Area at Iowa City.

The profile of the Iowa City-Cedar Rapids Corridor is characteristic of the standard of construction employed to develop electrified interurban railroads in Iowa in the early 20th century. Main track grades up to 2.06 percent and curve sharpness (curvature) up to 14 degrees exist on the CRANDIC Corridor. Segments of the Corridor in Coralville and Iowa City closely parallel public roadways and waterways.

Figure 5 below demonstrates a typical interurban railroad profile on the CRANDIC Corridor, with a 6.5 degree curve and 1 percent grade over the Iowa Avenue overpass in Iowa City (Milepost 24.7).

Figure 5. Curvature and Grade on the CRANDIC Corridor at Iowa Avenue in Iowa City *Source: HDR*

Figure 6 below demonstrates the proximity of the CRANDIC Corridor to public roadways in the University of Iowa campus at Front Street in Iowa City (Milepost 24.9).

Figure 6. Proximity of the CRANDIC Corridor to Public Roadways on the University of Iowa Campus in Iowa City *Source: HDR*

Figure 7 below demonstrates the proximity of the CRANDIC Corridor to waterways. Pictured is the CRANDIC Iowa City Yard along the east bank of the Iowa River in Iowa City (Milepost 25.4). The CRANDIC Corridor also parallels the Iowa River and Coralville Lake near Mid-River and Cou Falls, and the Iowa River between Coralville and the west side of Iowa City.

Figure 7. Proximity of CRANDIC Corridor to Waterways *Source: HDR*

3.3.3 Existing Track Characteristics

The CRANDIC Corridor Study Area main track consists predominantly of 80 to 112 lb./yd. jointed rail, with most of the Corridor having 90 to 100 lb./yd. jointed rail. Rail in sidings is 100 lb./yd. rail or smaller. Timber ties and crushed rock ballast are used on main tracks and sidings.[9] Track curves are constructed with superelevation, which is the difference between the heights of track. Superelevation is typically employed on railroad curves to allow trains to operate at higher speeds than would otherwise be attainable if the railroad profile was flat or level. The minimum track superelevation in the CRANDIC Corridor Study Area is 0.25 inch. Track unbalance refers to the amount of superelevation that would be necessary for a train to reach a balanced condition through a curve. CRANDIC operates with no track unbalance, as operating speeds are low enough in the Corridor at present that current track curvature and elevations meet FRA-approved superelevation requirements. Main track switches to sidings and industrial trackage are mostly No. 9 or smaller hand-throw turnouts.

A recently rehabilitated section of CRANDIC main track west of Rocky Shore Drive in Iowa City (Milepost 23.8) is shown in Figure 8 below.

Figure 8. CRANDIC Corridor Main Track Structure in Iowa City *Source: HDR*

[9] *Cedar Rapids & Iowa City Railway Track Chart*

3.3.4 Bridges and Drainage Structures

There are approximately 49 bridges and drainage structures that have been identified on the CRANDIC Corridor Study Area between the Eastern Iowa Airport in Cedar Rapids and central Iowa City, including nine bridges and approximately 40 culverts, as estimated by CRANDIC.[10] Bridge superstructure types vary and include through-plate girders (TPG), deck-plate girders (DPG), beam spans, and timber spans. The majority of bridges have open decks. Track culverts vary in size and condition, but mostly act to convey local drainage through the railroad embankment. Track ditches are also present along the majority of the Corridor. A typical track ditch consists of a swale located near the ballast shoulder that matches the grade changes of the rails, effectively allowing ballast and subgrade drainage to occur. There are some areas along the Corridor where ditches are filled in and will require cleaning. There are no rail tunnels on the CRANDIC Corridor.

Two prominent bridges on the Corridor are shown in the figures below, including the four-span through-plate girder Iowa River/Coralville Lake Bridge near Cou Falls (Milepost 12.1) in Figure 9, and the four-span deck plate girder Iowa River Bridge in Iowa City (Milepost 24.5) in Figure 10.

Figure 9. CRANDIC Iowa River/Coralville Lake Bridge near Cou Falls *Source: HDR*

Figure 10. CRANDIC Iowa River Bridge at Iowa City *Source: HDR*

[10] *Cedar Rapids & Iowa City Railway Bridge and Structures Inventory*

3.3.5 At-Grade Roadway Crossings

At-grade roadway crossings with the CRANDIC include public roadways which are protected by active warning devices and private crossings which are protected by passive warning devices. A total of 55 at-grade crossings have been identified in the CRANDIC Corridor between the Eastern Iowa Airport in Cedar Rapids (Milepost 5.3) and Gilbert Street (Milepost 25.8) in central Iowa City, as estimated by CRANDIC.

Legacy public crossings are typically protected by active warning devices, including crossbucks, flashing light signals, and bells. Newly established or upgraded public grade crossings are protected by active warning devices including crossbucks, flashing light signals, gates, and bells. Pedestrian sidewalk protection is minimal in the Corridor.

Private crossings are protected by passive warning devices, including crossbucks only.

Grade crossing surfaces are concrete pads or hot-mix asphalt on public crossings and hot-mix asphalt or gravel on private crossings.

Figure 11 below shows the typical active warning devices and concrete grade crossing surface used on the CRANDIC Corridor. Pictured is the Cherry Street grade crossing in North Liberty (Milepost 17.1).

Figure 11. Typical CRANDIC Corridor Grade Crossing at Cherry Street in North Liberty *Source: HDR*

3.3.6 Wayside Signaling and Wayside Asset Protection Devices

The CRANDIC Corridor is not equipped with a wayside signal system or wayside asset protection devices.

3.3.7 Fiber and Utilities

A fiber optic line exists in the CRANDIC right-of-way for the length of the Corridor. Several utilities exist within, parallel to, or cross the Corridor. The proximity of the fiber and utility infrastructure to the railroad is shown in the view of the CRANDIC Corridor near Mid-River in Figure 12 below.

Figure 12. Fiber Optic and Utility Infrastructure in the CRANDIC Corridor near Mid-River *Source: HDR*

3.3.8 Right-of-Way

The CRANDIC right-of-way generally varies from 50 to 100 feet in width. CRANDIC owns additional adjacent property in Cedar Rapids, North Liberty, Iowa City, and other locations.

Corridor right-of-way fencing through urban sections of the corridor is no longer complete. The right-of-way in urban areas is frequently crossed by pedestrians at locations other than roadway grade crossings.

3.3.9 Method of Operation

The Method of Operation for the CRANDIC Corridor varies by segment. The limits and type of each Method of Operation in effect, as well as the ownership and operators of the CRANDIC Corridor are identified in Table 3 below.

Table 3. CRANDIC Corridor Method of Operation, Owners, and Operators

LIMITS	OWNING RAILROAD	OPERATING RAILROAD	LINE DESIGNATION	METHOD OF OPERATION
Konigsmark / Eastern Iowa Airport in Cedar Rapids (Milepost 5.3) – Iowa City (Milepost 25.0)	Cedar Rapids & Iowa City Railway	Cedar Rapids & Iowa City Railway	CRANDIC Division 2	Yard Limits; Track Permit
Iowa City (Milepost 25.0) – Iowa City, End of CRANDIC Corridor Study Area (Milepost 25.8)	Cedar Rapids & Iowa City Railway	Iowa Interstate Railroad	IAIS Hills Industrial Spur	Yard Limits; Rule 6.28

Source: CRANDIC

Freight railroad operations in the CRANDIC Corridor are made at slow speeds. Maximum authorized speed for trains over the Corridor's main tracks operated by CRANDIC and Iowa Interstate is 10 mph for freight trains, except where operating conditions and track geometry require lower speeds. CRANDIC yard managers in Cedar Rapids authorize main track authority over CRANDIC Division 2 between Cedar Rapids and Iowa City via track permit. IAIS dispatchers in Cedar Rapids, Iowa, supervise operations on the IAIS Hills Industrial Spur in Iowa City, but do not provide main track authority.

No locomotive number-of-axle restriction is in place on the CRANDIC Corridor's main track between Cedar Rapids and Iowa City. Tonnage restrictions include a maximum gross weight of 286,000 lbs. per railcar between Cedar Rapids and Iowa City and 263,000 lbs. per railcar within Iowa City and beyond to Hills, outside of the Study Area. No vertical clearance restrictions were identified on the CRANDIC Corridor by CRANDIC.

3.3.10 Train Operations

The volume and frequency of typical freight train operations in the CRANDIC Corridor – from north to south – is described in this section.

Just outside of the Study Area, CRANDIC serves a large Archer Daniels-Midland (ADM) corn processing and ethanol production plant and other rail shippers in Cedar Rapids three times daily with a local train based at Cedar Rapids. CRANDIC also stores railcars for ADM within the CRANDIC Corridor, at the Airport Siding (Milepost 6.1) and on the main track between Konigsmark (Milepost 5.3) and Swisher (Milepost 8.3), as needed.

CRANDIC serves the line's sole customer between Cedar Rapids and Iowa City with a Cedar Rapids-based local train once weekly – Centro, a plastic pellets manufacturer at Milepost 16.6 in North Liberty.

CRANDIC stores frac sand cars at Coralville and on other sidings in the Corridor, as required.

The portion of the CRANDIC Corridor operated by IAIS as its Hills Industrial Spur in central Iowa City (Milepost 25.0 – Milepost 25.8) is served twice weekly by an IAIS local train based at the IAIS Iowa City Yard. City Carton Recycling, a cardboard recycler at Milepost 25.4, is the only active freight rail shipper on this segment presently.

CRANDIC did not identify any likely future freight services or activities that would be performed on the CRANDIC Corridor between Swisher (Milepost 8.3) and Iowa City (Milepost 25.0), or over the central Iowa City segment of the Corridor operated by IAIS (Milepost 25.0 – Milepost 25.8).

Passenger trains do not presently operate over any segment of the CRANDIC Corridor.

4. Potential Corridor Passenger Rail Service Characteristics

This section describes the general characteristics of the modes, or types, of passenger rail service technologies presently available in the U.S. and their potential applicability to the CRANDIC Corridor. The description includes examples of passenger rail corridor service types and levels, costs, and public utility.

The following potential modes of passenger rail services were considered for the CRANDIC Corridor, and are described in this section:

- Streetcar, electrified
- Light Rail Transit (LRT), electrified
- Commuter Rail Transit (CRT), including push-pull diesel locomotive powered commuter trains and self-propelled Diesel Multiple Unit (DMU) trains

Present passenger rail service technologies vary by mode. A streetcar can be a vintage or replica transit vehicle, or a modern vehicle generally in a shared use traffic lane. Light rail is almost exclusively a single vehicle type operating in a traffic lane, exclusive right-of-way, or sometimes sharing track with an active freight railroad. Commuter rail has several variations: Federal Railroad Administration (FRA)-Compliant diesel locomotive with passenger cars, FRA Compliant Diesel Multiple Unit (DMU), or FRA Alternatively Compliant DMU operating on or parallel to freight railroad tracks. The most suitable of these options for the CRANDIC Corridor are discussed in this section.

There are several characteristics of these modes that are fairly common. Generally speaking, each mode will tend to have similar environmental impacts. Traffic impacts wherever the routes pass through grade crossings exist for all modes. There will be noise and vibration impacts, although they will not be as intense as those created by the rail freight trains using the tracks. Streetcar and LRT modes would tend to be quieter because they are propelled by electric motors as opposed to internal combustion (diesel powered) engines.

Station impacts would be generally comparable for each mode as they are often driven primarily by the number of parking spaces provided at the various stations. Station platforms take up relatively little room along the tracks. If feeder bus service is offered at any station, it would generally add the equivalent of about two traffic lanes running parallel to the platform. Parking usually requires around one acre per 100 cars, leaving room for landscaping and internal circulation.

Communication and signaling infrastructure generally varies by the service frequency, speed, and any specific requirements of the owners or agencies with safety jurisdiction over the right-of-way. In practice, streetcars tend to have significantly less complex communication and signal systems because of the nature of their operations and operating environment. If streetcars were used in this CRANDIC Corridor, they would fall under the same FTA requirements as LRT or Commuter Rail.

In Table 4 below is a comparison of passenger rail modes that could potentially be implemented along the CRANDIC Corridor. A discussion of the modes and respective service characteristics is provided in this section.

Table 4. Comparison of Passenger Rail Modes

ATTRIBUTES	PASSENGER RAIL MODES		
	STREETCAR	LIGHT RAIL TRANSIT	COMMUTER RAIL TRANSIT
Typical Average Capacity per Vehicle	60	225	Over 250
Typical Service Range	Up to 4 miles	Up to 20 miles	Up to 50 miles
Impact on Land Use	Strong	Strong	Strong
Typical Station Spacing	0.25 mile – 0.5 mile	0.5 mile – 2 miles	1-4 miles
Maximum Operating Speed	35 mph	45-65 mph	Up to 60 mph
Average Operating Speed	5-8 mph	30-35 mph	40 mph
Typical Frequency of Service	Every 5-15 minutes	Every 5-15 minutes	Every 30 minutes
Typical Life of Vehicle	25 years	25 years	25 years
Typical Number of Residents and Jobs per Acre to Support Service	More than 100	More than 40	More than 40
Some Examples of Applications by Mode	Portland, Oregon; Dallas, Texas; Little Rock, Arkansas; Tampa, Florida; Kansas City, Missouri; Washington D.C.	St. Louis, Missouri; Minneapolis-St. Paul, Minnesota; Baltimore, Maryland; San Diego, California; Portland, Oregon; Charlotte, North Carolina	Nashville, Tennessee; Dallas-Fort Worth, Texas;, Salt Lake City, Utah; Washington D.C.; Miami and Orlando, Florida

Source: HDR

4.1 Streetcar

Streetcars were used in the U.S. primarily in the early 20th century to provide urban transportation service emanating from the central business district. Historically, Iowa once had streetcar networks in many of its major cities, including Des Moines, Cedar Rapids, Davenport, Council Bluffs, Sioux City, Iowa City, Waterloo, Mason City, Fort Dodge, Dubuque, and Burlington. Most streetcar systems in the U.S. were removed and replaced with bus service between 1945 and 1960, although select segments of large networks, notably in San Francisco, California; Philadelphia, Pennsylvania; and New Orleans, Louisiana, remained. There has been a resurgence of streetcar technology in downtown areas over the last 20 years, as streetcars have evolved into an urban development tool. The systems have used a variety of vehicles: vintage cars, replicas, and modern streetcar vehicles. The streetcar mode tends to operate like a downtown people mover linking downtown visitors, employees, and residents to jobs, shopping, and entertainment venues, and sometimes connecting to remote parking facilities. The systems are seen as a draw to attract short-term visitors and long-term residents, and are particularly popular among Millenials.

The vehicles have steel wheels operating on steel tracks typically sharing a travel lane with automobiles. The cars are generally powered electrically, by an overhead power supply. General streetcar service characteristics include:

- Frequent service (5 to 15 minute frequency).
- Closely spaced stops (0.25 to 0.5 mile).
- Level boarding (step on or off the streetcar without contending with steps, ramps, or lifts).
- Amenities at stops (shelter, fare vending).
- Self-service fare payment (faster boarding).

Figure 13 below shows a typical modern streetcar operation, on the Seattle Streetcar in Seattle, Washington.

Figure 13. Typical Modern Streetcar Operation *Source: HDR*

Streetcars are attractive because they are convenient and easy to understand, particularly for infrequent or new transit riders in the downtown area. While multiple bus lines in the downtown area may be confusing to these travelers, the short streetcar route is simple to understand. The frequent stops result in slow travel times, but provide convenient access to key destinations in the downtown area.

The typical benefits and challenges of the streetcar mode are identified and described in Tables 5 and 6 below.

Table 5. Benefits of Streetcar

BENEFITS OF STREETCAR	DESCRIPTION
Easy to Understand	• Frequent service, no schedule necessary • Short, simple route
Ease of Use	• Easy on/off • Frequent stops
Attractive to New Riders	• Modern vehicles appeal to Millenials • Vintage or Replica vehicles appeal to nostalgic
Enhances Economic Development	• Convenience induces new trips to Shopping and Entertainment • Frequently used as a tool to attract conventions and conferences

Source: HDR

Table 6. Challenges of Streetcar

CHALLENGES OF STREETCAR	DESCRIPTION
Implementation Cost	• Overhead power supply increases capital and maintenance costs. One battery powered streetcar recently began service in Dallas.
Capacity	• Streetcar vehicles tend to be short in length and have limited capacity. • Streetcars generally operate as single cars.

Source: HDR

4.2 Light Rail Transit

Light Rail Transit (LRT) operates singly or in short, usually two or four-car trains, on fixed rails. LRT operates in exclusive lanes or in its own dedicated right-of-way (including some instances where it is located within the median of a freeway and protected from vehicular traffic), and can operate in mixed traffic if needed to pass through downtown business districts and some residential neighborhoods. LRT vehicles are typically driven electrically with power being drawn from an overhead electric line, but new systems are in development that will allow the LRT vehicle to draw its power wirelessly from the guideway.

Figure 14 below shows a typical LRT operation with an overhead electric line, on MetroLink in the St. Louis, Missouri, area.

Figure 14. Typical LRT Operation in Railroad Right-of-Way *Source: HDR*

Light rail vehicles usually run on their own tracks, although there are some exceptions, including parts of the San Diego Trolley in San Diego, California, where freight trains share the tracks at night after passenger service has ended for the day, in an arrangement known as temporal separation. Light rail vehicles can also exit from dedicated rail corridors to travel through downtowns or other intensely developed areas. They become, in effect, like streetcars, and are served by raised platforms in medians or adjoining sidewalks. Some legacy examples include San Francisco, Los Angeles, San Diego, and Sacramento, California, and some recent examples can be found in Denver, Colorado; Salt Lake City, Utah; and Minneapolis, Minnesota.

LRT is often used to serve regional transit needs in cities that cannot support or afford heavy rail transit, where all grade crossings are eliminated. LRT is also less invasive than heavy rail because its power supply is overhead, thus allowing the vehicles to interface with vehicle and/or pedestrian traffic when necessary.

The typical benefits and challenges of the LRT mode are identified and described in Tables 7 and 8 below.

Table 7. Benefits of LRT

BENEFITS OF LRT	DESCRIPTION
Passenger Capacity	• Serves moderate to high passenger volume
Vehicle Speed	• Station spacing and quick acceleration supports a competitive travel speed
Distance Served	• Flexibility to serve short or long distance trips
Stations	• Has station spacing from 0.5 to 1 mile in shared ROW and 0.5 to 2 miles in exclusive ROW • May use low platforms, high platforms or both • May have elaborate or simple stations
Vehicles	• Uses overhead electric power collection • Operate as a single vehicle or in trains of up for four vehicles
Runningways/Guideways	• May operate in mixed traffic, with cross-traffic, or on exclusive ROW • Can negotiate steep grades (generally up to 5 percent) and small radius curves
Costs	• Has moderate operating and maintenance costs compared to commuter rail

Source: HDR

Table 8. Challenges of LRT

CHALLENGES OF LRT	DESCRIPTION
Visual Impacts	• The overhead power supply is unattractive, particularly in suburban conditions. Streetcar overhead power is usually obscured by the building on the horizon.
Costs	• Traction power supply increases costs compared to DMU

Source: HDR

4.3 Commuter Rail Transit

Commuter rail transit has typically employed locomotives and passenger rail cars similar to intercity service provided by Amtrak, but it covers shorter distances with more frequent service. Service is often concentrated during peak commuting hours from stations spaced one to four miles apart in the suburbs. Typically, there is a large gap between the innermost suburban station and a single downtown station. Commuter rail typically shares tracks with freight service, and is sometimes operated by the freight railroads. The commuter rail train consist typically operates in a push-pull configuration, which allows the trains to be operated from either end, thus eliminating the need to turn trains at terminal points.

The legacy systems found in large cities such as Chicago, Illinois; Boston, Massachusetts; New York, New York; and San Francisco, California, as well as new systems in a number of other metropolitan areas, carry large passenger volumes requiring long trains that can save operating costs by using a single locomotive for power. Figure 15 shows a typical commuter rail system operation – Sounder in the Seattle, Washington, area.

Figure 15. Typical Commuter Rail Operation *Source: HDR*

Newer commuter rail transit systems tend to operate in smaller transit markets requiring shorter trains (e.g. Austin, Fort Worth, and Dallas, Texas, and Sonoma and Marin Counties in the San Francisco Bay Area of California). These newer systems are moving towards the use of self-propelled Diesel Multiple Unit (DMU) vehicles. These vehicles are smaller and less imposing than the traditional legacy commuter rail transit consist with locomotives and bi-level passenger cars. Due to their reduced scale, they offer some potential to operate on city streets such as the MetroRail in Austin, Texas, as shown in Figure 16 below.

Figure 16. DMU Vehicle in Austin, Texas *Source: HDR*

Within the DMU category, there are two vehicle and service options: FRA Compliant and FRA Alternatively Compliant. The FRA Compliant vehicles meet the current FRA safety regulations that are generally built around specifications providing the structural integrity to withstand a crash between passenger trains and freight trains on shared use corridors. The FRA Alternatively Compliant vehicle is designed to absorb the crash stress while protecting passengers, in a matter similar to modern automobiles. The FRA Alternatively Compliant vehicles must satisfy FRA review and be accepted by the freight railroad owner if shared use is assumed. The FRA Alternatively Compliant vehicles are generally somewhat smaller, faster, and less expensive. The smaller size also better facilitates the potential for operation along city streets.

The typical benefits and challenges of the commuter rail transit mode are identified and described in Tables 9 and 10 below.

Table 9. Benefits of Commuter Rail

BENEFITS OF CRT	DESCRIPTION
Passenger Capacity	• Serves high passenger volumes during commuting periods
Vehicle Speed	• Operates medium to high speed (depending on number of stops and distance between stops)
Distance Served	• Serves long distance trips connecting people who live in the suburbs with job opportunities in the urban core
Stations	• Has station spacing from 1 to 4 miles • May use low platforms, high platforms or both • Improved station appearance
Vehicles	• Uses diesel multiple assumed for this analysis
Runningways/Guideways	• Operates on exclusive ROW or shares tracks with freight service

Source: HDR

Table 10. Challenges of Commuter Rail

CHALLENGES OF CRT	DESCRIPTION
Frequency	• Tends to operate with lower frequency with minimal mid-day and evening service
Destination Access	• Tends to use one station downtown, frequently requiring transfer or long walk to final destination.

Source: HDR

5. Conceptual Cost Estimate

This section identifies typical representative conceptual capital and operations and maintenance costs and a typical infrastructure plan for each mode of potential passenger rail service identified in Section 4 and potential applicability of each to the 20.5-mile CRANDIC Corridor between the Eastern Iowa Airport in Cedar Rapids and Gilbert Street in central Iowa City.

The cost experience for the various modes is highly dependent upon the type of right-of-way used by the various passenger rail modes. The typical streetcar operation is entirely street-running within a downtown or residential area. Therefore, average streetcar cost per mile tends to reflect significant utility relocation and protection that is not characteristic of existing freight railroad rights-of way. The streetcar costs used in this report reflect actual experience; however, streetcar implementation in the CRANDIC Corridor would more likely be comparable to the Light Rail Transit capital cost forecast. Modern LRT projects have used street-running and exclusive right-of-way, with a number of recent projects including some elevated and subway segments that increase average cost per mile. The LRT cost data used in this analysis is based primarily upon at-grade construction within rail right-of-way since there are a number of representative projects of this type for support. The typical capital cost range for commuter rail projects is the smallest of the three passenger rail modes under consideration, and varies depending upon the use of existing freight railroad infrastructure assets in the corridor.

5.1 Capital Cost Estimate Approach

Unless otherwise stated, the representative conceptual capital costs presented in this section are applicable to all potential passenger services modes identified in Section 4, including streetcar, light rail transit, and commuter rail transit. The quantities developed for the estimate of representative costs are based upon conceptual level analysis of the CRANDIC Corridor and application of typical U.S. railroad and transit industry standard approaches and typical costs on other projects. The conceptual capital cost includes the rehabilitation of CRANDIC infrastructure as appropriate and construction of new infrastructure in the Corridor. This section includes the methodology and assumptions for deriving the capital costs and potential infrastructure requirements for each category. Estimated capital costs for right-of-way acquisition, site preparation, and potential earthwork are not included in this estimate.

Potential rehabilitation of CRANDIC infrastructure in the Corridor is described below:

5.1.1 Rehabilitation of Track Structures and Track

The Corridor's existing track structure would likely require track and track structures components to be renewed or upgraded to support the implementation of passenger rail service. This is necessary to meet federal regulations for passenger-rail services if the commuter train mode is selected, to provide for adequate safety, reliability, and ride quality for all modes, and to reduce regular and capital maintenance program cost after operation commences.

Bridge rehabilitation is primarily centered on the conversion of existing open-deck bridges to ballast-deck bridges to provide for passenger ride quality and reduce on-going maintenance costs. For the CRANDIC Corridor, the estimate assumes converting a majority of the open-deck bridges to ballast decks. This concept is consistent with many bridge infrastructure improvements on other passenger rail corridor implementation projects in the U.S. Additionally, the two bridge replacements proposed within the estimate are in the style of previous structures replacements on CRANDIC's network. Other nominal bridge improvements and conditional work are also included in this estimate.

Conventional tie-renewal and rail upgrade is needed along the majority of the CRANDIC Corridor. Total track renewal is an option, but will not create any cost savings; however, total track renewal does eliminate the need to create a short-term tie renewal program and through plowing, creates a uniform subgrade, improving roadbed drainage along the corridor. This estimate considers the economics of track tie renewal, and focuses on implementing conventional tie-renewal at a minimum of 33 percent renewal rate. It is assumed that CRANDIC or a potential passenger rail operator will replace the rest of the ties through routine maintenance cycles, in future years.

The assumed rehabilitation scope is applicable to all potential passenger service modes and is identified below:

- Four bridge deck conversions from existing open-deck bridges to ballast-deck bridges at Milepost 12.0, Milepost 24.6, Milepost 24.7, and Milepost 24.8
- The addition of bridge ballast retainers at Milepost 24.9
- Miscellaneous bridge repairs
- Miscellaneous culvert repairs and replacements
- Ditching and drainage work
- Mainline and siding tie renewal
- Track undercutting on ballast-deck bridges and at other spot locations, as may be required
- Track surfacing over the entire Corridor

Potential construction of infrastructure on in the CRANDIC Corridor is described below:

5.1.2 Construction of Track Structures and Track

New infrastructure construction is typically required when implementing passenger rail service on a freight-only corridor. Rail replacement is assumed to be 115 lb./yd. Continuously Welded Rail (CWR) for main track replacement and 100 lb./yd. secondhand rail for siding replacement. The construction of new Number 11 turnouts are assumed for all main track turnout replacements in order to match the proposed rail size and to increase diverging turnout speeds to 20 miles per hour. Track derails are also included in the estimate, as a means to prevent rolling stock from entering the main track from adjacent tracks. Additionally, one meet-pass siding was assumed in the estimate to accommodate staging of freight trains of unit train length for continued freight operations and to potentially accommodate meet-pass events between passenger trains expecting to meet within the Corridor. Specific component renewals and track infrastructure needs, to support passenger rail service in the CRANDIC Corridor, will be identified with project stakeholders in a future study.

The assumed construction scope is applicable to all potential passenger service modes and is identified below:

- Two new bridges:
  - Milepost 17.5, to replace a timber open-deck bridge
  - Milepost 23.8; previously considered for replacement in past studies, per CRANDIC
- Main track rail replacement
- Siding rail replacement
- CWR joint elimination
- New track construction for one meet-pass siding
- Turnout and derail replacements, as required

5.1.3 Rolling Stock

The cost includes procurement of new passenger rail equipment required to operate the service. This includes streetcars, light rail vehicles, DMU vehicles, and locomotives and coaches, as appropriate for each mode. The actual vehicle costs will depend upon a variety of local conditions ranging from peak ridership level to physical operating constraints. Representative costs per vehicle in 2015 dollars are outlined below:

- Streetcar: $3.5 million-$4.5 million
- Light Rail Transit: $4.5 million-$5.5 million
- Commuter Rail Transit (DMU equipment): $6.5 million-$7.5 million
- Commuter Rail Transit (push-pull diesel locomotive powered commuter trainset, including one locomotive and one bi-level passenger rail car): $9.0 million-$9.5 million

The study assumed conceptual equipment requirements for the Corridor based upon the following:

- Typical operating headways by mode on other passenger rail corridors
- The potential for up to 1,000 daily riders on the CRANDIC Corridor, as interpreted from the ridership projections in the Cedar-Iowa River Transit Project Feasibility Study of 2006 (described in detail in Section 2.1)

The following equipment by mode was assumed for the CRANDIC Corridor to create a fleet to accommodate potential scheduled operations and routine equipment maintenance cycles:

- Streetcar: 6 vehicles
- Light Rail Transit: 4 vehicles
- Commuter Rail Transit (DMU): 4 vehicles
- Commuter Rail Transit (push-pull diesel locomotive powered commuter train): 4 locomotives and 4 bi-level cars

Updated ridership and revenue forecasting, specific equipment requirements, and the potential cost for acquiring rehabilitated secondhand equipment rather than new equipment are not included in this study.

5.1.4 Signaling and Communications

This category includes the cost of at-grade crossing automatic warning devices (with constant warning time devices), wayside intermediate signals, asset protection detectors, switch machines, and associated power drops. It is assumed that the Method of Operation on the CRANDIC Corridor will be upgraded to a wayside Centralized Traffic Control (CTC) signal system, regardless of mode, to provide adequate safety and efficiency of train movement. For the commuter train mode, CTC along with a Positive Train Control (PTC) overlay will likely be required to meet requirements of the Rail Safety Improvement Act of 2008 (RSIA). There are also control points and wayside asset protection detectors, data radios, and PTC interfaces. Signal material is assumed to be microprocessor based and electrocode; no wayside signal pole line is included.

Cost for all modes assumes bells, flashing lights, and gates for public at-grade crossings and stop signs and crossbucks at all private at-grade crossings.

Cost assumes PTC for the commuter rail transit mode, in which a shared use of the corridor with freight trains is possible. Temporal separation is assumed for the streetcar and light rail transit modes, in which passenger trains operate during daylight hours and freight trains operate at night on shared-use corridors. For these latter two modes, PTC implementation is not assumed, but it may be required, if a waiver from the FRA is not obtained.

5.1.5 Stations

The cost to construct potential passenger rail stations for the Corridor includes generic warming shelters, platforms, lighting, signage, and parking. Platforms are considered single-face and 300 feet in length.

In consideration of the 20.5-mile length of the Corridor and the typical spacing of stations on other passenger rail corridors, six passenger rail stations were assumed. The following general locations could potentially host a station:

- Iowa City Terminal (south of Downtown Iowa City)
- Downtown Iowa City / University of Iowa Campus
- University of Iowa Hospitals
- University of Iowa Events Venues
- Downtown Coralville
- Coralville Commuter
- South Oakdale

- Oakdale
- North Liberty
- Cou Falls
- Swisher
- Eastern Iowa Airport/Cedar Rapids Terminal

Potential station quantity, locations, requirements, and amenities in the Corridor would be identified through coordination with project stakeholders in future study.

5.1.6 Layover and Maintenance Facility

This cost includes construction of a facility where passenger rail rolling stock is maintained and staged between scheduled operations and used as a train operations base that accommodates the transit system workforce and all administrative, management, and control functions. The cost assumes that the existing CRANDIC Shops and offices in Cedar Rapids (outside of the CRANDIC Corridor) will not be used to maintain passenger rail equipment or provide a location for an operations base. A new facility typically includes:

- Combined shop and office building for use as an equipment maintenance and train operations base
- Parking for vehicles
- Tracks to stage and maintain equipment
- Track access pads
- Potable water and general utility services
- Electrical service for standby power, as required
- Perimeter security fencing
- Site lighting

The potential maintenance facility footprint required to support the passenger rail service in the Corridor and potential sites for a maintenance facility would be identified through coordination with project stakeholders in future study.

5.1.7 Traction Power System

This cost is applicable to construction of an overhead electric traction system required for the streetcar and light rail transit modes only. An overhead electric traction system includes:

- Overhead Catenary System (OCS)
- Traction power substations
- Traction power feed/return system

5.1.8 Grade Crossing Surface and Approaches

This cost is applicable to the replacement of crossing surfaces with concrete panels and other roadways surface and approach improvements at existing at-grade road/rail crossings. The estimate assumed the reuse of existing concrete panels at crossings presently so equipped in the Corridor.

5.1.9 Fencing

This cost is applicable to construction of new fencing in the right-of-way through the urban sections of the Corridor.

5.1.10 Professional Services

This cost is applicable to all potential passenger service modes and includes preliminary and final design, environmental review and permitting, and project management for design and construction of a passenger rail service in the Corridor.

5.1.11 Contingency

Estimated capital costs above include a 25 percent contingency for each category, with the exception of Professional Services, which has a 5 percent contingency.

5.2 Operations and Maintenance Cost Estimate Approach

The representative conceptual Operations and Maintenance costs presented in this section are applicable to the potential passenger service modes identified in Section 4, including streetcar, light rail transit, and commuter rail transit. The representative costs developed for this estimate are based upon conceptual level analysis of the CRANDIC Corridor and application of typical U.S. railroad and transit industry standard approaches and typical Operations and Maintenance costs on other projects. This section identifies what is included in the annual Operations and Maintenance costs for each category. Operating costs for insurance, overhead, marketing, and management rates are not included in this conceptual cost estimate.

Annual Operations and Maintenance costs typically cover all aspects of daily passenger rail service delivery and maintenance, including:

- Vehicle operation (i.e. labor, fuel)
- Routine vehicle maintenance (i.e. labor, spare parts)
- Routine track, bridge, and right-of-way maintenance
- Overhead Catenary System (OCS) maintenance for the streetcar and light rail transit modes
- Station maintenance
- Maintenance of signal and communications infrastructure

5.3 Conceptual Cost Estimate by Passenger Rail Mode

A range of conceptual capital and annual Operations and Maintenance costs for each potential passenger rail mode on a per-mile basis are identified in 2015 dollars in Table 11 below. The cost estimates account for implementation of passenger rail service over the entire 20.5-mile CRANDIC Corridor; the potential for a phased implementation strategy and the associated costs are discussed in Section 5.4.

Table 11. CRANDIC Corridor Conceptual Cost Estimate Range in 2015 Dollars

ATTRIBUTES AND MODE	STREETCAR	LIGHT RAIL TRANSIT	COMMUTER RAIL TRANSIT
Capital Cost per Mile	$52 - $80 million	$42 - $65 million	$12 - $25 million
Potential Capital Cost to Implement Passenger Rail Service on the CRANDIC Corridor (20.5 miles)	$1.07 - $1.64 billion	$860 million - $1.33 billion	$250 million - $520 million
Annual Operations and Maintenance Cost per Mile	$275,000 - $325,000	$275,000 - $325,000	$275,000 - $325,000
Potential Annual Operations and Maintenance Cost on the CRANDIC Corridor (20.5 miles)	$5.6 million - $6.7 million	$5.6 million - $6.7 million	$5.6 million - $6.7 million

Source: HDR

Note that typical streetcar costs reflect street-running projects on downtown streets. The conceptual capital cost estimate developed for a streetcar application in the CRANDIC Corridor would be more characteristic to the capital cost for Light Rail Transit in the table figure above. The capital and Operations and Maintenance costs are based upon a spreadsheet model applied to commuter rail transit. Streetcar and Light Rail Transit systems operate in a significantly different manner than Commuter Rail Transit, making their costs difficult to estimate for this application. Their operating costs would exceed commuter rail transit due to the additional maintenance of the Overhead Catenary System (OCS).

Potential construction of new trackage between the CRANDIC Corridor at First Avenue in Coralville and the Iowa River Landing, an emerging mixed-use development in north Coralville has been suggested by CRANDIC, and is not shown in the cost summary above. The conceptual capital cost to construct a wye at the junction with the existing CRANDIC Corridor in Coralville and a spur track north to the Iowa River Landing in north Coralville (approximately 0.8 mile of new track construction) and a station at the Iowa River Landing would be approximately $6.0 - $6.5 million in 2015 dollars. In addition, the conceptual annual operations and maintenance costs for each passenger rail mode on this 0.8-mile segment would be approximately $220,000 to $260,000 in 2015 dollars.

Estimated capital costs for right-of-way acquisition and operating costs for insurance, overhead, and management rates, and marketing costs are not included in any of the conceptual cost estimates presented in this section. CRANDIC presently owns the right-of-way in the CRANDIC Corridor between Iowa City and the Eastern Iowa Airport at Cedar Rapids and some adjacent property at locations along the CRANDIC Corridor.

The conceptual estimate of capital costs for the CRANDIC Corridor in this 2015 Iowa City-Cedar Rapids Passenger Rail Conceptual Feasibility Study are substantially greater, at between $250 million and $1.64 billion depending upon passenger rail mode (i.e. streetcar, light rail, and commuter rail), than estimated conceptually in the 2006 Cedar-Iowa River Rail Transit Project Feasibility Study, at about $22 million for a commuter rail option. The principal reasons for this increase are as follows:

- The 2006 Study chose to decrease upfront capital costs for track, bridges and structures, and roadway crossing infrastructure, by pushing upfront costs as much as possible into post-implementation maintenance and operating expense. This 2015 Study did not make this choice, as it would:
    - Greatly increase the total cost for track, bridges and structures, and roadway rehabilitation, by requiring it to be accomplished “under traffic” after the passenger rail service is in operation, with concomitant loss of efficiency of railroad or contractor forces caused both by the requirement to keep the railroad open for service during rehabilitation activities, by spreading out fixed costs such as equipment rental and maintenance, staging, and mobilization over a longer period of time.
    - Reduce the quality of the service, in key areas such as ride quality, reliability of service, and trip time consistency.
    - Reduce the safety of the passenger service, by deferring key improvements such as new rail and subgrade and drainage improvements.
- The 2006 Study did not envision a wayside signal system or a Positive Train Control (PTC) system. PTC was made a requirement for all commuter rail operations (with some exceptions that may not be applicable to the CRANDIC Corridor) by the Railway Safety Act of 2008. PTC systems currently approaching certified-for-use status in the U.S. require a wayside signal backbone. The wayside signal system, while not an absolute requirement for a streetcar or light rail system, it is generally a necessity if more than one vehicle is to operate at a time, to assure separation of trains and collision avoidance, and for efficiency of meet-pass events between trains.
- The 2006 Study assumed a very high level of capital replacement costs post-implementation, particularly of track materials and track surface-and-line, whereas the 2015 Study sought to have a complete railroad with low capital replacement costs post-construction.
- The 2006 Study assumed very low unit costs for track, bridges and structures, and grade-crossing rehabilitation, and for vehicles. The 2015 Study, in contrast, used actual experienced averages of other transit systems recently implemented in the U.S., to avoid “project confirmation” bias.

The 2015 Iowa City-Cedar Rapids Passenger Rail Conceptual Feasibility Study, due to budget constraints, did not engineer the CRANDIC Corridor to any extent, but instead adapted averages. However, subsequent analysis that considers the specifics of the CRANDIC Corridor, may find that the CRANDIC Corridor has sufficient differences from national averages to greatly change the estimated cost calculated for the 2015 Study.

5.4 Conceptual Phasing and Implementation Plan

Phased implementation of passenger rail service in the CRANDIC Corridor may be considered based upon need for the service and the availability of funding to design and construct it. Passenger rail service could potentially be phased geographically, as identified by CRANDIC and presented in this section.

5.4.1 Phase 1 – Iowa City to North Liberty

Phase 1 service could begin at Gilbert Street in Iowa City (one block south of the potential station site for the Chicago-Iowa City intercity passenger service under development near Clinton Street) and travel in a northwesterly direction to North Liberty – for a total of approximately 9.5 miles. The route would serve the Iowa City business district; University of Iowa schools, hospitals, and sports and entertainment venues; Coralville; Iowa River Landing in Coralville; and outlying suburban developments at Oakdale and North Liberty. It could also promote intermodal connectivity with Iowa City and university transit, regional and long-distance bus services, and the proposed Chicago-Moline-Iowa City intercity passenger rail service.

Based upon the full Corridor conceptual cost estimate provided in Section 5.3 above, the a range of conceptual capital and annual operations and maintenance costs for each potential passenger rail mode on a per-mile basis are identified in 2015 dollars for the 9.5-mile, Phase 1 segment of the CRANDIC Corridor in Table 12 below.

Table 12. Conceptual Cost Estimate Range for Phase 1 Segment of CRANDIC Corridor in 2015 Dollars

ATTRIBUTES AND MODE	STREETCAR	LIGHT RAIL TRANSIT	COMMUTER RAIL TRANSIT
Capital Cost per Mile	$52 - $80 million	$42 - $65 million	$12 - $25 million
Potential Capital Cost to Implement Passenger Rail Service on the CRANDIC Corridor – Phase 1 (9.5 miles)	$494 million - $760 million	$399 million - $618 million	$114 million - $238 million
Annual Operations and Maintenance Cost per Mile	$275,000 - $325,000	$275,000 - $325,000	$275,000 - $325,000
Potential Annual Operations and Maintenance Cost on the CRANDIC Corridor – Phase 1 (9.5 miles)	$2.6 million - $3.1 million	$2.6 million - $3.1 million	$2.6 million - $3.1 million

Source: HDR

5.4.2 Phase 2 – North Liberty to the Eastern Iowa Airport in Cedar Rapids

Phase 2 could extend the Phase 1 service from Iowa City, Coralville, and North Liberty north to Swisher and the Eastern Iowa Airport at Cedar Rapids – for a total of approximately 11 miles. It could also promote intermodal connectivity with the Eastern Iowa Airport and Cedar Rapids Transit bus services.

Based upon the full Corridor conceptual cost estimate provided in Section 5.3 above, a range of conceptual capital and annual operations and maintenance costs for each potential passenger rail mode on a per-mile basis are identified in 2015 dollars for the 11-mile, Phase 2 segment of the CRANDIC Corridor in Table 13 below.

Table 13. Conceptual Cost Estimate Range for Phase 2 Segment of CRANDIC Corridor in 2015 Dollars

ATTRIBUTES AND MODE	STREETCAR	LIGHT RAIL TRANSIT	COMMUTER RAIL TRANSIT
Capital Cost per Mile	$52 - $80 million	$42 - $65 million	$12 - $25 million
Potential Capital Cost to Implement Passenger Rail Service on the CRANDIC Corridor – Phase 2 (11 miles)	$572 million - $880 million	$462 million - $715 million	$132 million - $275million
Annual Operations and Maintenance Cost per Mile	$275,000 - $325,000	$275,000 - $325,000	$275,000 - $325,000
Potential Annual Operations and Maintenance Cost on the CRANDIC Corridor – Phase 2 (11 miles)	$3.0 million - $3.6 million	$3.0 million - $3.6 million	$3.0 million - $3.6 million

Source: HDR

5.4.3 Additional Potential Phased Implementations

Additional phased implementations in the CRANDIC Corridor could potentially include:

- Increased service frequencies or expansion of stations and station access on the Phase 1 segment.
- Increased service frequencies or expansion of stations and station access on the Phase 2 segment.
- Potential construction of a new wye and spur track from the existing CRANDIC Corridor in Coralville north to the Iowa River Landing, a new mixed-use development in Coralville, during Phase 1 or Phase 2.
- Potential construction of a new layover and maintenance facility in the Corridor during Phase 2 or Phase 3 (CRANDIC may be able to accommodate maintenance at its existing Cedar Rapids Shop during Phase 1).
- Potential construction of a Phase 3 service from the Eastern Iowa Airport in Cedar Rapids north to downtown Cedar Rapids potentially using segments of the CRANDIC and other active and inactive rail corridors in Linn County.
- Potential upgrade of the streetcar mode to a light rail system mode during Phase 2 or Phase 3.
- Potential phasing of additional track and bridge infrastructure improvements during Phase 2 or Phase 3.

A range of conceptual capital and annual operations and maintenance costs for each potential passenger rail mode on a per-mile basis for the additional potential phased service implementations identified above were not developed for this study.

6. Environmental Review

The section summarizes the general environmental requirements for construction and implementation of a passenger rail corridor service, and its potential applicability to all of the service modes identified for the CRANDIC Corridor in Section 4.

6.1 Assumptions for Environmental Review

The process for environmental documentation review for a passenger rail project in the CRANDIC Corridor assumes the following:

- The document will analyze the environmental impact(s) of a passenger rail service in the Corridor between Iowa City and Eastern Iowa Airport in Cedar Rapids.
- The Federal Railroad Administration (FRA) is the Lead Agency for the National Environmental Policy Act (NEPA).
- The Iowa DOT or one or more local Iowa jurisdictions will be the Grantee, and if Iowa DOT is not the Grantee, it may be the Lead Agency.
- Based upon the characteristics of the Corridor and the range of alternatives, the environmental class of action is either an Environmental Assessment (EA) or an Environmental Impact Statement (EIS)

6.2 Review Process

The Lead Agency and Grantee for the project will conduct scoping to determine major project issues and additional studies that may be needed in accordance with FRA requirements. The findings will be documented. If the review is supported by the scoping process, a class of action recommendation for FRA review and a Project Work Plan, which specifically includes a project schedule and detailed scope of work, will be submitted. The FRA will decide if the class of action for the project is an EA or an EIS. This step may be delayed until completion of additional environmental analysis.

If it is determined that the appropriate environmental class of action is an EIS, the Lead Agency will issue a Notice of Intent (NOI) to advise agencies and the public about the preparation of an EIS. The NOI will invite the public to comment on the scope of the document, purpose and need of the project, alternatives to be considered, impacts to be evaluated, and methodologies to be used in the evaluation.

The Lead Agency and Grantee will prepare technical studies and appropriate documentation in accordance with FRA's environmental procedures. The analysis approach will follow EIS requirements if that determination was made at the end of scoping. If there was no prior determination of class of action, the analysis will include typical impacts associated with rail projects including noise, traffic, a cultural and historical impact assessment, and other components. A determination of class of action would be developed by this time. If it is warranted, an EIS would be conducted which including a broad range of impacts analyzed at a significant level of detail.

If an EIS is warranted, a Public Involvement Plan (PIP) will be developed which identifies various private and public stakeholders. These will include, but are not limited to agency partners, community groups, advocacy groups, business groups, potential riders of the passenger rail service, freight railroads hosting the service, and potential passenger rail service providers. The PIP typically includes strategies for the receiving and processing public input.

The Lead Agency and Grantee will complete an FRA-approved EA or EIS for construction of the project. For an EIS, the environmental document will be circulated and a public hearing for public input will be held. The FRA will complete a Record of Decision (ROD) for the EIS document. The Grantee will identify all necessary mitigation and permits required for project construction and implementation.

The environmental process may potentially take between 12 months and 36 months to complete, depending upon the environmental class of action and the review process.

6.3 Contents of the Environmental Document

The EA or EIS will include, but is not limited to, the following:

- Definition of the project including a description of existing conditions in the Corridor.
- Purpose and Need for the project.
- Identification and analysis of project build alternatives.
- Assessment of impacts of the proposed action and alternatives.

6.4 Impacts of MAP-21 on the Environmental Process

The U.S. Department of Transportation's (USDOT) Moving Ahead for Progress in the 21st Century Act (MAP-21) revised the process for preparing an EIS in Draft and Final formats. After the Draft EIS (DEIS) has been prepared by the Grantee and approved by the Lead Agency, MAP-21 provides for the preparation of the Final EIS (FEIS) during Project Development by attaching errata sheets to the DEIS if certain conditions are met. In addition, the USDOT allows Grantees to develop a single document that combines the FEIS and the Record of Decision (ROD).

Once the Lead Agency approves the Grantee's request to enter into Project Development (including project Environmental Analysis and Preliminary Engineering), MAP-21 requires that the Grantee submits the FEIS within two years of entry.

6.5 Mitigation Monitoring Plan

Included in the environmental documentation is a Mitigation Monitoring Plan (MMP) which details mitigation monitoring measures to be implemented during construction of the project. The MMP will identify and describe adverse and beneficial effects of the project, identify specific measures to mitigate the adverse impacts, and list parties that are responsible for ensuring compliance. When appropriate to obtain permits for certain items, the MMP will identify those permits and highlight the agencies responsible for issuance of the permits.

7. Federal Safety and Governance Regulatory Requirements

This section describes the basic federal regulatory requirements of the Surface Transportation Board (STB), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA) for the implementation and operation of a passenger rail service, including provisions that require future federal approvals if federal funding is obtained. This section also describes the general federal regulatory requirements that are triggered for co-locating passenger rail service on an active freight railroad (like the CRANDIC), or, if freight rail services are no longer required, the requirements for abandonment of common-carrier service.

A proposed rail passenger service on the CRANDIC Corridor may be impacted by one or more of three federal agencies, listed below:

- Surface Transportation Board (STB)
- Federal Rail Administration (FRA)
- Federal Transit Administration (FTA)

The possible role of each agency in the establishment and operation of a potential passenger rail service on the CRANDIC Corridor is summarized in the following sections.

7.1 Surface Transportation Board

The STB is generally focused upon the economic regulation of the general railway system in the U.S., dealing with rail line construction; implementation of new freight or passenger common-carrier services that expand geographically beyond existing services; rate and service levels, adequacy, and disputes; acquisition, sale, or merger of private rail freight operators; and abandonments of common-carrier obligations. The STB generally does not have jurisdiction over mass transportation provided by a local government authority. The most common STB involvement related to urban passenger service results from abandonment of an existing freight common-carrier obligation associated with implementation of new rail passenger service. In addition, STB authority may be required for implementation of a new commuter rail service if it is jointly marketed or operated with an interstate passenger rail service. Because the CRANDIC segment proposed for the Corridor is currently a freight railroad with a common-carrier obligation, STB abandonment procedures may be required if the mode selected, or the characteristics of the passenger service, preclude or substantially modify the CRANDIC's ability to provide for its common-carrier obligation.

Railroad abandonment requirements follow a process documented in 49 CFR 1152: Abandonment and Discontinuance of Rail Lines and Rail Transportation. The Iowa DOT actively participates in the railroad abandonment process within the state.[11] The key activities in the railroad abandonment process are summarized below:

- Filing of a notice of intent weekly for three consecutive weeks in a local newspaper in each county in which any part of the line is located.
- Filing the Abandonment Application with the STB and appropriate State offices. Application will describe physical condition of the line, financial aspects of the operation, and justification for the abandonment.
- Notice of intent to file and offer of financial assistance must be made within 30 days of the application filing.
- Public involvement for 45 days following the application filing for persons who oppose the application. An oral hearing may be requested. Notarized comments must be sent to the STB and the railroad/representative filing the application.
- Applicant's reply or rebuttal to opposition within 60 days of application filing.
- Deadline for STB decision on merits of case within 110 days of filing.
- Offers of financial assistance to preserve service must be made within 10 days of STB decision.

[11] *Railroad Abandonment, Iowa Department of Transportation, Revised March 25, 1997*

A carrier may file for a Notice of Exemption if it can certify that:

- No local traffic has moved over the line for at least 2 years; and
- Any overhead traffic on the line can be rerouted over other lines;
- No formal complaint filed by the user of rail service on the line is pending or has been decided in favor or the complainant within two years.

The STB must find that the line is not necessary to carry out the rail transportation policy of the U.S. Government as established in Title 49 USC 10101, and the line is of limited scope and continued regulation is unnecessary to protect shippers from abuse of market power before the abandonment can be approved.

Parties seeking a public use condition in an abandonment proceeding must file a written request for public use condition with the STB no later than 45 days after the application is filed. If successful negotiations are not completed within 180 days, the railroad company is free to accept any other offer.

7.2 Federal Railroad Administration

Like the STB, the FRA is generally focused upon the general railway system, and has no authority over transit or urban rail passenger services operating totally outside of that system. When a rail passenger service operates within, or crosses right-of-way within the general railway system, that passenger system falls within FRA jurisdiction. Passenger service in shared-use corridors (using general railway system tracks or right-of-way) is subject to FRA safety regulations, which are substantial. Much of FRA's role relates to the potential for shared use corridors and includes such matters as safety, equipment compatibility, and signal systems.

Many light rail systems have no connection to the general railway system, and are located outside of freight right-of-way beyond FRA jurisdiction. Of those light rail operations that do, however, most that are subject to FRA safety regulations run within a shared right-of-way parallel to an active freight railroad track, as is the case with some segments of the Santa Clara Valley Transportation Authority and Union Pacific Railroad in the San Jose, California area, although there are a few examples in which tracks are actually shared. Examples include the San Diego Trolley and the San Diego & Imperial Valley Railroad in San Diego, California. In such cases, a temporal separation exists between passenger and freight operations in which the two modes share the same corridor but do not operate at the same time. Transit agencies and freight railroads have operating windows during which each has exclusive use of the track.

Commuter rail operations frequently share tracks with freight railroads, and are therefore subject to FRA regulations. An example is Metra commuter rail operations in Chicago, Illinois, which share lines with Class I freight railroads, including BNSF Railway, Canadian National Railway, Canadian Pacific Railway, Norfolk Southern Railway, and Union Pacific Railroad.

The FRA safety regulations fall within the seven categories outlined below:

- **Signal and Train Control** – The Signal and Train Control (S&TC) Division promotes an understanding of and compliance with the various Federal regulations related to: signal and train control systems; highway-rail grade crossing active warning systems; and the hours of service laws applicable to signal employees.
- **Track and Structures** – Track and infrastructure failure is the second leading cause of train derailments in the U.S. FRA programs improve understanding of vehicle-track interaction.
- **Motive Power and Equipment** – It promotes an understanding of and compliance with Federal standards to inspect locomotives, passenger and freight cars, and its safety appliances such as air brakes.
- **Operating Practices** – The OP Division examines railroad carrier operating rules, employee qualification guidelines, and carrier training and testing programs, Hours of Service Act, accident and personal injury reporting requirements to determine compliance.
- **Hazardous Materials** – Recognize incident trends by analyzing the accident/incident database and find, through research, ways to minimize the incident rate of leaks, spills, and damage to the environment due to hazardous materials releases.

[12] *http://www.gpo.gov/fdsys/pkg/CFR-2011-title49-vol4/pdf/CFR-2011-title49-vol4-part229.pdf*

- **Industrial Hygiene** – Responsible for evaluating compliance with rules and regulations governing railroad employee exposure to various workplace health risks such as diesel exhaust, and other harmful contaminants.
- **Highway-Rail Grade Crossing Safety**

FRA regulations contained in 49 U.S. Code of Federal Regulations Parts 200-299[12] which apply to passenger rail services include the following:

Part 211 Appendix A (Waivers Related to Shared Use of Trackage or Rights-of-Way by Light Rail and Conventional Operations) – By statute, FRA may grant a waiver of any rule or order if the waiver "is in the public interest and consistent with railroad safety." 49 U.S.C. 20103(d). This Part explains the waiver process. Waiver petitions are reviewed by FRA's Railroad Safety Board (the "Safety Board") under the provisions of 49 CFR Part 211. Waiver petitions must contain the information required by 49 CFR 211.9. The Safety Board can, in granting a waiver, impose any conditions it concludes are necessary to assure safety or are in the public interest. If the conditions under which the waiver was granted change substantially, or unanticipated safety issues arise, FRA may modify or withdraw a waiver in order to ensure safety.

Light rail equipment, commonly referred to as trolleys or street railways, is not designed to be used in situations where there is a reasonable likelihood of a collision with much heavier and stronger conventional rail equipment. However, existing conventional railroad tracks and rights-of-way provide attractive opportunities for expansion of light rail service.

Light rail operators who intend to share use of the general railroad system trackage with conventional equipment and/or whose operations constitute commuter service (see Appendix A of 49 CFR Part 209 for relevant definitions) will either have to comply with FRA's safety rules or obtain a waiver of appropriate rules. Light rail operators whose operations meet the definition of urban rapid transit and who will share a right-of-way or corridor with a conventional railroad but will not share trackage with that railroad will be subject to only those rules that pertain to any significant point of connection to the general system, such as a rail crossing at grade, a shared method of train control, or shared highway-rail grade crossings.

Shared use of track refers to situations where light rail transit operators conduct their operations over the lines of the general system, and includes light rail operations that are wholly separated in time (temporally separated) from conventional operations as well as light rail operations operating on the same trackage at the same time as conventional rail equipment (simultaneous joint use). Where shared use of general system trackage is contemplated, FRA believes a comprehensive waiver request covering all rules for which a waiver is sought makes the most sense. FRA suggests that a petitioner caption such a waiver petition as a Petition for Approval of Shared Use so as to distinguish it from other types of waiver petitions. The light rail operator should file the petition. All other affected railroads will be able to participate in the waiver proceedings by commenting on the petition and providing testimony at a hearing on the petition if anyone requests such a hearing. If any other railroad will be affected by the proposed operation in such a way as to necessitate a waiver of any FRA rule, that railroad may either join with the light rail operator in filing the comprehensive petition or file its own petition.

In situations where the light rail operator is an urban rapid transit system that will share a right-of-way or corridor with the conventional railroad but not share trackage, any waiver petition should cover only the rules that may apply at any significant points of connection between the rapid transit line and the other railroad. A Petition for Approval of Shared Use would not be appropriate in such a case.

Part 213 (Track Safety Standards) – This part prescribes minimum safety requirements for railroad track that is part of the general railroad system of transportation. The requirements prescribed in this part apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from the requirements in this part, may require remedial action to provide for safe operations over that track. This part does not restrict a railroad from adopting and enforcing additional or more stringent requirements not inconsistent with this part.

Part 214 (Railroad Workplace Safety) – The purpose of this part is to prevent accidents and casualties to employees involved in certain railroad inspection, maintenance, and construction activities. This part prescribes minimum federal safety standards for the railroad workplace safety subjects addressed herein. This part does not restrict a railroad or railroad contractor from adopting and enforcing additional or more stringent requirements not inconsistent with this part.

Part 217 (Railroad Operating Rules) –Through the requirements of this part, the FRA learns the condition of operating rules and practices with respect to trains and other rolling equipment in the railroad industry, and each railroad is required to instruct its employees in operating practices.

To ensure that each railroad employee whose activities are governed by the railroad's operating rules understands those rules, each railroad to which this part applies shall periodically instruct each such employee on the meaning and application of the railroad's operating rules in accordance with a written program retained at its system headquarters and at the division headquarters for each division where the employee is instructed.

After November 21, 1994, each Class I railroad, each Class II railroad, the National Railroad Passenger Corporation (Amtrak), and each railroad providing commuter service in a metropolitan or suburban area shall file each new amendment to its code of operating rules, each new timetable, and each new timetable special instruction with the Federal Railroad Administrator within 30 days after it is issued.

Part 218 (Railroad Operating Practices) – This part prescribes minimum requirements for railroad operating rules and practices. Each railroad may prescribe additional or more stringent requirements in its operating rules, timetables, timetable special instructions, and other special instructions.

Part 219 (Control of Alcohol and Drug Use) – The purpose of this part is to prevent accidents and casualties in railroad operations that result from impairment of employees by alcohol or drugs.

This part prescribes minimum federal safety standards for control of alcohol and drug use. This part does not restrict a railroad from adopting and enforcing additional or more stringent requirements not inconsistent with this part.

Part 220 (Railroad Communications) – Each railroad shall maintain a written program of instruction and examination of each railroad operating employee and each supervisor of the railroad operating employee on the meaning and application of the railroad's operating rules implementing the requirements of this subpart if these requirements are pertinent to the employee's duties. If all requirements of this subpart are satisfied, a railroad may consolidate any portion of the instruction or examination required

Thirty days before commencing to use radio communications in connection with railroad operations each railroad shall retain one copy of its current operating rules with respect to radio communications at the locations prescribed in paragraphs (b)(1) and (b)(2) of this section. Each amendment to these operating rules shall be filed at such locations within 30 days after it is issued. These records shall be made available to representatives of the FRA for inspection and photocopying during normal business hours.

Part 225 (Railroad Accidents/Incidents: Reports Classification and Investigations) – The purpose of this part is to provide the FRA with accurate information concerning the hazards and risks that exist on the Nation's railroads. FRA needs this information to effectively carry out its regulatory responsibilities under 49 U.S.C. Chapters 201-213. FRA also uses this information for determining comparative trends of railroad safety and to develop hazard elimination and risk reduction programs that focus on preventing railroad injuries and accidents. Any State may require railroads to submit to it copies of accident/incident and injury/illness reports filed with FRA under this part, for accidents/incidents and injuries/illnesses which occur in that State.

Part 227 (Occupational Noise Exposure) – The purpose of this part is to protect the occupational health and safety of employees whose predominant noise exposure occurs in the locomotive cab. This part prescribes minimum federal health and safety noise standards for locomotive cab occupants. This part does not restrict a railroad or railroad contractor from adopting and enforcing additional or more stringent requirements.

Part 228 (Hours of Service of Railroad Employees; Recordkeeping and Reporting; Sleeping Quarters) – This part prescribes reporting and recordkeeping requirements with respect to the hours of service of certain railroad employees and certain employees of railroad contractors and subcontractors.

Part 234 (Grade Crossing Safety, Including Signal Systems, State Action Plans, and Emergency Notification Systems) – This part prescribes minimum:

- Maintenance, inspection, and testing standards for highway-rail grade crossing warning systems;
- Standards for the reporting of failures of highway-rail grade crossing warning systems and for the actions that railroads must take when such systems malfunction;
- Requirements for particular identified States to develop State highway-rail grade crossing action plans; and,
- Requirements that certain railroads establish systems for receiving toll-free telephone calls reporting various unsafe conditions at highway-rail grade crossings and pathway grade crossings, and for taking certain actions in response to those calls.

This part does not restrict a railroad from adopting and enforcing additional or more stringent requirements not inconsistent with this part.

Part 238 (Passenger Equipment Safety Standards) – General Principles of Reliability-Based Maintenance Programs:

Must have a reliability-based maintenance programs are based on the following general principles. A failure is an unsatisfactory condition. There are two types of failures: functional and potential. Functional failures are usually reported by operating crews. Conversely, maintenance crews usually discover potential failures. A potential failure is an identifiable physical condition, which indicates that a functional failure is imminent.

Part 239 (Passenger Train Emergency Preparedness) – The purpose of this part is to reduce the magnitude and severity of casualties in railroad operations by ensuring that railroads involved in passenger train operations can effectively and efficiently manage passenger train emergencies.

This part prescribes minimum federal safety standards for the preparation, adoption, and implementation of emergency preparedness plans by railroads connected with the operation of passenger trains, and requires each affected railroad to instruct its employees on the provisions of its plan. This part does not restrict railroads from adopting and enforcing additional or more stringent requirements not inconsistent with this part.

Each railroad to which this part applies shall adopt and comply with a written emergency preparedness plan approved by FRA under the procedures of § 239.201. The plan shall include the following elements and procedures for implementing each plan element.

Part 240 (Qualification and Certification of Locomotive Engineers) – The purpose of this part is to ensure that only qualified persons operate a locomotive or train.

This part prescribes minimum Federal safety standards for the eligibility, training, testing, certification and monitoring of all locomotive engineers to whom it applies. This part does not restrict a railroad from adopting and enforcing additional or more stringent requirements not inconsistent with this part. As provided for in § 240.101, each railroad must have a program for determining the qualifications of each person it permits or requires to operate a locomotive. In designing its program a railroad must take into account the track age and terrain over which it operates, the system(s) for train control that are employed, the operational design characteristics of the track and equipment being operated including train length, train makeup, and train speeds. Each railroad must submit its individual program to FRA for approval as provided for in § 240.103. Each program must be accompanied by a request for approval organized in accordance with this appendix.

A number of deliverables for new start passenger railroads under FRA jurisdiction is required by CFR, and would be identified and described in a future study phase.

7.3 Federal Transit Administration

The Federal Transit Administration planning requirements would also be applied to the project if funding is pursued from one of the three FTA capital improvement programs identified below:

- New Starts: New or extended Commuter Rail, Bus Rapid Transit (BRT), Light Rail Transit (LRT), Streetcar, and heavy rail (RRT) projects with a total cost exceeding $250 million and a New Starts Funding request exceeding $75 million.
- Small Starts: Same range of modes with a total budget less than $250 million and Small Starts funding request less than $75 million.
- Core Capacity: Increased capacity by 10 percent for a project at or exceeding capacity or will be within five years.

This discussion will be limited to the New Starts and Small Starts since Core Capacity is not relevant to the potential for passenger rail implementation in the CRANDIC Corridor.

All New Starts and Small Starts projects must follow a rigorous analysis in order to compete for funding in this competitive grant program. This program is described in greater detail in Section 8.0.

Any project receiving FTA funding is subject to FTA oversight through project planning, design, and testing. Although the FTA maintains oversight for the grants that it awards, the grant administration and project management responsibility is assigned to the grantee. The FTA defines oversight as a continuous review and evaluation of grantee and FTA processes to ensure compliance with statutory, administrative, and regulatory requirements. For New Starts projects, this activity is generally led by a Project Management Oversight Consultant (PMOC) reporting the FTA regional office. In this role, the PMOC supplements the FTA technical staff, monitoring the overall schedule, and budget.

The grantee is required to develop a Project Management Plan (PMP) that defines in detail how it will manage the project. FTA provides guidance in development of the manual in FTA Circular 5200.1. FTA has also developed several documents that may guide the development of the PMP and overall project management, including:

- FTA Quality Management System Guidelines
- FTA Project and Construction Management Guidelines
- Construction Project Management Handbook

While the grantee has some discretion in establishing its management approach, once the document is accepted by FTA the grantee cannot deviate from the PMP. The elements of the PMP are identified below:

- Basis for project (project description, financial plan, and legal authority for implementation)
- Environmental Documentation/Mitigation Plan
- Design Control Plan
- Design Change and Configuration Control
- Project Controls
- Cost Control Procedures
- Schedule Control Procedures
- Risk Control Procedures
- Dispute and Conflict Resolution
- Project Delivery and Procurement

- Labor Relations and Policies
- Construction of Fixed Infrastructure
- System Integration, Pre-Revenue Operations and Revenue Service
- Grantee Technical Capacity and Capability
- Quality Assurance/Quality Control
- Safety and Security Plan
- Real Estate Acquisition and Management Plan
- Fleet Management Plan

Many of the items defined in the PMP are deliverables that must be approved by the FTA before entry into Final Design. A checklist identifying those deliverables is included in Figure 17 below.

NEW STARTS PROJECT PLANNING AND DEVELOPMENT
CHECKLIST OF PROJECT SPONSOR SUBMITTALS TO FTA TO ENTER FINAL DESIGN (FC)

PRODUCTS	***FTA CONCURRENCE DATE***	***REFERENCE (Regulations, Guidance and Other Resources)***
COMPLETION OF PRELIMINARY ENGINEERING	-	
Project Definition/Scope	-	
Project Plans, Drawings, Design Criteria, Standards and Specifications with refined project definition for overall project, tracks or routes, stations, stops and other structures		• FTA P&CM Guidelines (Chapter 4) • Full Funding Grant Agreement Guidance 5200.1A (Chapter 2)
Master Permitting Plan and Schedule		
Geotechnical Baseline Report		
Documentation of passenger level boarding design for all stations and/or satisfactory determination of infeasibility for one or more stations and satisfactory alternative plan for accessibility		• 49 CFR Pars 27, 37 & 38 • 36 CFR 1191 & 1192 • DOT Disability Law Guidance. "Full-Length, Level-Boarding Platforms in New Commuter and Intercity Rail Stations" (09/01/05) • Association of American Railroads (ARR) Clearance Plates A-F, H & L • DoD Strategic Rail Corridor Network (STRACNET) clearance profile
Project Cost, Schedule and Financial Plan	-	• FTA P&CM Guidelines (Chapter 4) • Standard Cost Categories for Capital Projects • Alternatives Analysis Technical Guidance (Part II.3)
Capital Cost Estimate and Project Schedule in Original Format and Standard Cost Category (SCC) Format (refined and updated to support final design request)		
Summary of O&M Cost Assumptions/Productivities (if O&M costs changed since approval to enter PE)		• Alternatives Analysis Technical Guidance (Part II.4) • Reporting Instructions
Financial Plan and Supporting Information Supporting Final Design Requests and Financial Capacity Assessment		• 49 CFR 611.11 • Financial Capacity Policy Circular 7008.1A • Guidance for Transit Financial Plans June 2000 • Reporting Instructions • Guidelines and Standards for Assessing Local Financial Commitment
Project Development Requirements	-	• 23 CFR 771 • 49 CFR 622 • 2006 Guidance on New Starts Policies and Procedures - May 16, 2006 (Section 1) - Reference for New Starts Rating Information in ROD
Final NEPA Documentation (i.e., Categorical Exclusion, Finding of No Significant Impact, or Record of Decision) including description of required environmental permits and New Starts rating Information in ROD is the New Starts Rating is less than "medium"		

PRODUCTS	*FTA CONCURRENCE DATE*	*REFERENCE (Regulations, Guidance and Other Resources)*
Before and After Study Documentation of Methods and "Predicted" Results and Identification of Responsible Contractors		• Draft Before and After Guidance Available on Request • 2006 Guidance on New Starts Policies and Procedures - May 16, 2006
TIP and STIP Programming of Final Design and Construction (and update or amendment of long range plans, if needed)		• Capital Program Circular 9300.1A • Transportation Planning Final Rule
Travel Forecasts (If changed since approval to enter PE)	-	• Travel Forecasting for New Starts Proposals (From FTA Workshop) • Alternatives Analysis Technical Guidance (Part II.5-6) • Reporting Instructions
Documentation of Methodologies and Assumptions		
Summit Reports and Maps		
Travel Forecasts Template		
Annualization Factor Justification		
PROJECT MANAGEMENT PLAN (PMP) UPDATE	-	• 40 CFR 633 (Subpart C) • FTA P&CM Guidelines (Chapter 2-4) • Grant Management Circular 5010.1C (Chapter 1) • Full Funding Grant Agreements Guidance 5200.1A (Chapter 2) • QA/QC Guidelines
Basic Requirements Update	-	
Project Sponsor Staff Organization		
Project Budget & Schedule		
Procedures Update	-	
Document Control Procedures		
Change Order Procedures		
Material Testing Procedures		
Internal Reporting Procedures		
Operational Testing Procedures		
Quality Assurance/Quality Control (QA/QC)		
Plans Update	-	• FTA P&CM Guidelines (Chapter 2 & 3)
Contingency Management Plan (identifying significant areas of uncertainty in scope cost and schedule)		
Real Estate Acquisition Management Plan (RAMP)		• 49 CFR 24 • Uniform Act • Real Estate Page of FTA Website and FTA Real Estate Course
Rail Fleet Management Plan (RFMP)		• Grant Management Circular 5010.1C (Chapter 1) • FFGA Guidance 5200.1A (Chapter 2)
Bus Fleet Management Plan (BFMP)		
Safety and Security Management Plan (SSMP)		• SSMP Circular 5800.1 • Full Funding Grant Agreements Guidance 5200.1A (Chapter 2) • 49 CFR 659 • FTA P&CM Guidelines (Chapter 2)
Operating Plan		• FTA P&CM Guidelines (Chapter 3)
Configuration Management Plan		• FTA P&CM Guidelines (Chapter 5)

PRODUCTS	*FTA CONCURRENCE DATE*	*REFERENCE (Regulations, Guidance and Other Resources)*
Other Project Management Plans	-	• Capital Program Circular 9300.1A (Chapter V) • Grant Management Circular 5010.1C (Chapter 1) • FTA P&CM Guidelines (Chapter 4)
Value Engineering Analysis Report		
Procurement Contract Packages	-	• FTA P&CM Guidelines (Chapter 4) • Third Part Contracting Circular 4220.1E
Contracting Plan for Final Design Phase		
Contracting Plan for Construction/Procurement (draft policies and procedures for all proposed contracting) inclusive of profit strategies and proposed risk allocation measures)		
Claims Avoidance Plan for Final Design		• FTA P&CM Guidelines (Chapter 3)
Claims Avoidance Plan for Construction/Procurement Phase		
General Conditions (preliminary drafted for design, construction and procurement contracts)		
Third Party Agreements	-	• Grant Management Circular 5010.1C (Chapter 1) • 23 CFR 645, Utilities • FTA P&CM Guidelines (Chapter 4) • FFG Guidance 5200.1A (Chapter 2)
Utility Agreements (negotiated and completed to the extent possible)		
Master, Interagency, Public/Private, Joint Development, Railroad and Right of Way Agreements (negotiated and completed to the extent possible)		
NEW STARTS TEMPLATES, CERTIFICATIONS, AND OTHER REPORTS	-	• Reporting Instructions
New Starts Criteria Templates and Certifications		
SCC Annualized Cost Worksheets		• Standard Cost Categories for Capital Projects
Land Use Supporting Information		• Reporting Instructions • Guidelines and Standards for Assessing Transit-Supportive Land Use
Making the Case Document		• Reporting Instructions • Examples on FTA Website
ADMINISTRATIVE REQUIREMENTS	-	• Capital Program Circular 9300.1A (Chapter 6)
Legal Capacity (Authority to undertake implementation of proposed transit mode)		
Authority to pursue and contract with project delivery method proposed (if not design-bid-build)		• FTA P&CM Guidelines (Chapter 4)
Grantee Letter of Request for FD Initiation		

Figure 17. FTA Project Deliverables *Source: FTA*

In addition to meeting FTA requirements for project evaluation, design, and construction, projects receiving FTA funding must also meet the Buy America requirements outlined in 49 CFR Part 661. These requirements have had a significant impact on the range of rolling stock available for rail passenger services. The light rail vehicle industry has adapted to these requirements more quickly than commuter rail, providing a range of vehicles that will meet FTA requirements. There are a small number of Diesel Multiple Units (DMU) that are now available for commuter rail implementation, including both FRA compliant and alternatively compliant vehicles.

It is possible that a proposed passenger rail project may fall within both the FRA and FTA programs. A common example would be a commuter rail project sharing tracks with an active freight railroad and that is also seeking FTA New Starts or Small Starts funding. In this instance, the FRA safety regulations would apply, along with the FTA project evaluation and project management requirements. The two agencies have worked together in the past to apply complementary regulations when appropriate.

8. Funding Availability Assessment

This section identifies the federal capital project funding programs that may be applied to a proposed rail passenger project like that under study for the CRANDIC Corridor, and summarizes the application and review process for the predominant funding sources for fixed-guide way transit projects – Section 5309 New Starts and Small Starts programs.

8.1 Potential Project Funding Sources for Capital Costs

Federal grants have traditionally been a prime source of capital funding for many new transit systems in the United States, and also a source of some operating funds. Federal transit funds are distributed under the provisions of Title 49, Chapter 53, of the United States Code, as amended by MAP-21. Transit funds are distributed through both formula and discretionary programs. Following Congressional appropriation of funds, specific amounts that are available for states and urbanized areas under formula programs (as established by federal legislation, i.e. MAP-21) are published in an apportionment notice in the Federal Register, as well as amounts for allocated programs. Allocated program funds that are otherwise distributed by Congress are made available to the Federal Transit Administration (FTA) for "discretionary" distribution. All federal transit funds are categorized as grants, regardless of if they are discretionary or formula-based.

Grant recipients must submit a grant application to the FTA to receive federal transit funds, typically on an annual basis. When FTA approves the grant, the funds are "granted" or obligated to the applicant agency and applied in support of a specific procurement process or as reimbursement for expenditures that have already been made. Transit funds can be used for a variety of expenditures as defined in laws that authorize individual spending programs. Eligible expenditures fall into two general categories: capital expenditures (for which most federal funds may be used), and other expenditures limited to specific programs.

A number of grant programs are available to provide federal funding for transit services, primarily addressing capital needs, but others support planning and design, and in some limited cases, operations and maintenance. Funding programs include traditional FTA programs, opportunities to "flex" funds to transit from the Federal Highway Administration (FHWA), and other "non-traditional" funding opportunities from other agencies such as the Federal Railroad Administration (FRA), Housing and Urban Development (HUD), and the Environmental Protection Agency (EPA).

The primary federal transit funding opportunities are presented in the categories of FTA Formula Grant Programs, United States Department of Transportation (USDOT) Flexible Funds, FTA Discretionary Grant Programs, USDOT Discretionary Grant Programs, and other Federal Funding Opportunities. The following paragraphs highlight those sources that are most likely to be relevant to the development of passenger rail projects, including the potential for a passenger rail service on the CRANDIC Corridor.

8.1.1 New Starts and Small Starts Capital Investments

The FTA New Starts and Small Starts (Section 5309 Major Capital Investments) programs were discussed briefly in Section 7.3 above. These are a highly competitive discretionary grant programs. The federal capital share (in both New Starts and Small Starts) typically does not exceed 50 percent of the total project capital cost, and the federal share has been declining over time. Local entities typically need to identify 50 percent or more of the match to federal funds. The New Starts program has been funded under the various omnibus Transportation Funding authorization bills, the most recent being the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFTEA-LU) and a two-year extension (through Fiscal Year 2014) called MAP-21. Funds are authorized under these programs, but are still subject to annual Congressional appropriations. Once a bill, such as MAP-21 has been authorized, annual appropriations must be made by Congress to fund the programs identified in the legislation.

8.1.2 Short-Term Infrastructure Investment Programs

The American Recovery and Reinvestment Act of 2009 (ARRA) created new funding for a variety of short-term infrastructure investment programs. These included the Transportation Investment Generating Economy

Recovery (TIGER), Urban Circulator, Bus Livability, and a number of other discretionary transportation grant programs administered by the USDOT and FTA. Five rounds of TIGER applications have been approved and funded and a sixth round is currently in process. All of these programs are open to fierce competition nationwide and have generally, in total, released $1 billion or less in each overall round. Typically, over 400 applications have been received in each round, and competition is open to shovel-ready transportation projects covering most transportation modes except airports and maritime facilities.

Through the first five rounds, approximately 270 projects out of several thousand applications have received grants. Only about 20 of these projects are rail transit related, most of them involving streetcars, light rail, or improvements to passenger rail stations and facilities on existing systems. Fewer than five commuter rail type projects have received funding under the program. Commuter rail type projects are competing with project entries under many other modes, including bus, road, rail, ports, pedestrian, bike, and multi-modal projects, and a significant portion of funds are reserved for rural locations. In order to be competitive, application requests have to be $20 million or less. It is unclear whether there will be any additional rounds of funding under any of these programs beyond the current competition.

Most recent TIGER project awards have been in the $10 million to $18 million range and represent less than 50 percent of total project costs. However, chances of a project receiving funding from multiple federal sources decreases as the total proportion of federal funding in the project increases. For example, if a project is already receiving a significant amount of federal funding under another federal grant program, such as New or Small Starts, its chances of getting substantial, if any, TIGER funds seem to decrease, based on a review of past awards experience.

Several other federal grant programs have been used by other cities as a source of limited "fill-in" funds to help fund capital costs of commuter rail lines. These programs include the Congestion Mitigation Air Quality (CMAQ) program, Surface Transportation Program (STP) funds, and possible inputs of Economic Development Administration (EDA) and FHWA funding. CMAQ funds are federal funds allocated to the states which must be used for transportation projects that result in reduced traffic congestion and air pollution, such as traffic signalization, bus replacements, and other transit-related projects. In these programs, the amounts of funding are typically limited and are focused on specifically targeted project elements or objectives: for example, use of FHWA funds for street and streetscape improvements associated with the reconstruction of a major street into a multimodal transit corridor. In Cincinnati, Ohio, $4 million of regional CMAQ funds were allocated to a streetcar project. A streetcar project in Kansas City, Missouri, includes $17 million in STP and CMAQ funds as part of the overall funding package for its $102 million total cost.

8.2 Overview of FTA New Starts and Small Starts Programs

The FTA New Starts and Small Starts are the primary funding sources for new rail projects. The FTA program applies a standard set of evaluation criteria to facilitate comparison of projects nationally "on a level playing field." The evaluation measures have changed over time to reinforce consistency in project analysis and to simplify the project rating process. The nature of these changes has tended to favor projects with many short trips (streetcar, Bus-Rapid Transit, some light rail) at the expense of projects with a small number of long trips, such as commuter rail.

The FTA New Starts Program includes three major steps listed below and as shown in Figure 18 below:

- **Project Development**, which allows up to two years for the completion of planning, preliminary engineering, and approval of a project's environmental document.
- **Final Design/Engineering**, during which design and engineering continue and commitments for project funding are established.
- **Full Funding Grant Agreement (FFGA)**, which moves the project into construction.

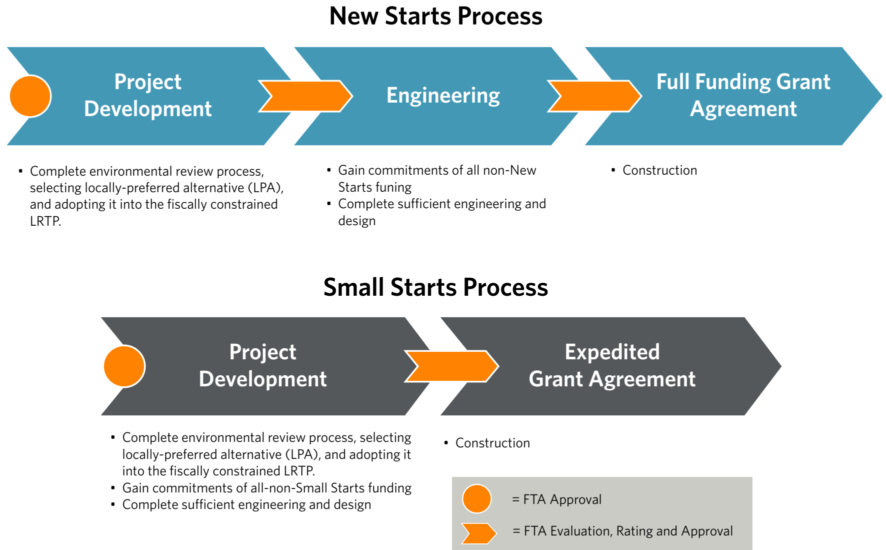

Figure 18. FTA Project Development Process for New Starts Projects *Source: Federal Transit Administration*

While the boxes appear to show distinct boundaries for activities by phase, there is some overlap between the phases. As noted earlier, the Small Starts process is somewhat abbreviated because the projects tend to be of a smaller scale. The project evaluation criteria and rating system is extremely precise, and has evolved considerably during the FTA discretionary program. The most recent update of the evaluation process is described in *Proposed Interim Policy Guidance, Federal Transit Administration Capital Investment Program, and April 2015*.

FTA approval is necessary to enter the Project Development phase. That approval is based upon a brief description of the project outlining project participants and roles, identifying the financial resources available to complete Project Development, and summarizing the characteristics of the proposed project. The FTA New Starts Evaluation is then applied at the end of the Project Development and engineering phases as outlined below, leading to a Full Funding Grant Agreement committing federal funding for project implementation.

The Small Starts program is streamlined to facilitate implementation of smaller, lower cost projects. The process is similar to New Starts except that the engineering phase is combined with Project Development, eliminating the FTA approval step between Project Development and engineering. The Small Starts criteria are applied initially at the end of the combined Project Development. A recommended project is then eligible for an Expedited Grant Agreement (EGA) to fund project implementation.

8.2.2 Project Evaluation Components

The current project evaluation process is documented in FTA's "Reporting Instructions for Section 5309 New Starts Criteria, July 2014" and "Reporting Instructions for the Section 5309 Small Starts Criteria, July 2014." This guidance provides prospective project applicants with information on how the FTA evaluates and rates projects applying for New Starts and Small Starts funding. The rating established by the FTA is the combination of two, equally weighted summary ratings: Project Justification and Local Financial Commitment. A minimum of a "medium" rating on both the project justification and on the local financial commitment is necessary in order to earn an overall medium or better project rating. These summary ratings are further broken down by individual evaluation criteria. Each of the evaluation criteria are rated on a five point scale, from low to high. At the conclusion of the assessment, all the scores are combined to produce an overall project rating. Figure 19 below presents an overview of the rating process and associated weighting of criteria. This guidance will be subject to changes that are implemented from the "Proposed Interim Policy Guidance Federal Transit Administration Capital Investment Program, April, 2015."

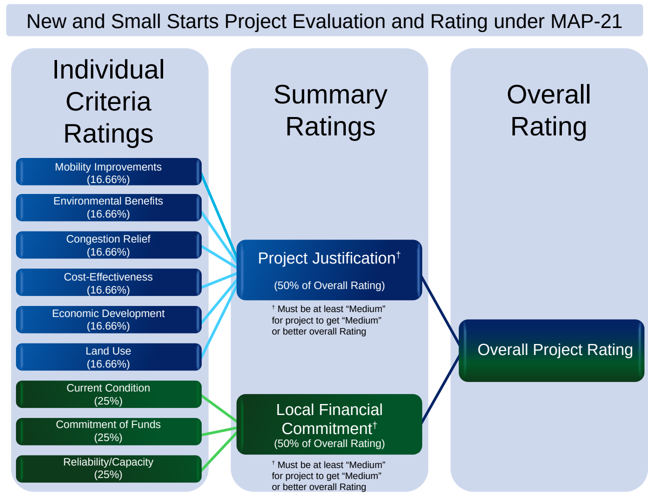

Figure 19. Evaluation and Rating Process

Source: Federal Transit Administration (2014)

8.2.3 Project Justification Criteria

The FTA evaluates all potential projects seeking New Starts funding against six, equally weighted project justification criteria. These are described in detail below.

- **Mobility Improvements** – This criterion considers the project's total number of trips, with a heavier weighting for those trips that would be made by transit-dependent persons. These persons are defined by FTA as those within a household who do not have access to a car. The calculation is determined by adding together the estimated number of transit trips on the project taken by non-transit dependent persons and the number of transit trips on the project taken by transit dependent persons multiplied by a factor of two.
- **Economic Development** – The evaluation process for this criterion examines a number of topics: transit supportive plans and policies within the project area, the demonstrated performance of those plans and policies, and the policies and tools in place to preserve or increase the amount of affordable housing in the project corridor.
- **Environmental Benefits** – The environmental benefits measure for New Starts projects is the sum of the monetized value of the benefits resulting from the changes in air quality and Greenhouse Gas (GHG) emissions, energy use, and safety divided by the same annualized capital and operating cost of the project as used in the cost-effectiveness measure (described in the next bullet). The FTA multiples the resulting ratio by 100 and expresses the environmental benefit measure as a percentage. The measure is similar for Small Starts; however, the benefits are divided only by the annualized FTA capital grant amount instead of the total annualized capital cost and operating cost. This provides a rating advantage for Small Starts projects under this criterion since the denominator in the equation (annualized cost) is limited to the FTA capital cost contribution. No operating costs are included, providing another rating advantage for Small Starts projects. Both the New Starts and Small Starts are rated using the same set of evaluation thresholds.
- **Cost-Effectiveness** – The FTA measures cost-effectiveness of a project submitted for New Starts evaluation and rating by calculating the annual capital and operating and maintenance cost per passenger on the project. As with environmental benefits, the Small Starts calculation considers only the annualized FTA grant amount instead of the total annualized capital cost and operating cost. The FTA evaluation thresholds applied in this measure differ between New and Small Starts projects, however, which largely offsets the Small Starts annualized capital cost advantage. The cost limitation to the FTA grant amount (omitting operating costs) provides the opportunity for Small Starts projects to increase ridership by improving service without impacting the cost element of the rating. This would enhance the cost-effectiveness rating, although the additional costs associated with expanded service may impact the financial viability of the project.
- **Land Use** – The land use measure for New Starts projects includes an examination of existing corridor and station area development; existing corridor and station area development character; existing station

area pedestrian facilities, including access for persons with disabilities; existing corridor and station area parking supply; and proportion of affordable housing. Potential changes to the affordable housing evaluation are outlined in the Proposed Interim Guidance distributed by FTA for review in April 2015.

- **Congestion Relief** – The FTA has not applied a measure for congestion relief at this time. Therefore, FTA has assigned a medium rating for this criterion for all projects. A proposed approach to measure congestion relief is documented in the Proposed Interim Guidance, and will likely be applied in the future.

8.2.4 Local Financial Commitment Criteria

The FTA evaluates all potential projects seeking New Starts funding against three Local Financial Commitment criteria. These are described in detail below.

- **Current Capital and Operating Condition (25% of Local Financial Commitment Rating)** – The evaluation of this measure is based upon the average fleet age (if applicable), bond ratings if given within the last two years, the current ratio of current assets to current liabilities, and recent service history including whether there have been significant cuts in service. In arriving at a current condition rating, the majority of the emphasis will be placed on the fleet age and current ratio. The bond rating and service history will have less emphasis.
- **Commitment of Capital and Operating Funds (25% of Local Financial Commitment Rating)** – The evaluation of this measure will be based on the percentage of funds (both capital and operating) that are committed or budgeted versus those considered only planned or unspecified. If there are significant private contributions, such involvement would increase the commitment of funds rating one level. The FTA will determine on a case by case basis whether private contributions are significant based on the unique arrangements that may be presented. Private contributions can include outside investments that result in cost-effective project delivery, financial partnering, and other public-private partnership strategies.
- **Reasonableness of the Financial Plan (50% of Local Financial Commitment Rating)** – The evaluation of this measure will be based upon whether capital and operating planning assumptions are comparable to historical experience, the reasonableness of the capital cost estimate of the project, adequacy of meeting state of good repair needs, and the project sponsor's financial capacity to withstand cost increases or funding shortfalls.

8.3 New Starts Versus Small Starts Programs

The main advantage of the New Starts program over the Small Starts program is the ability to pursue federal funding at the 50 percent level regardless of the total project capital cost. The allowable ratio is actually 80 percent; however, competition has driven the maximum feasible federal request to 50 percent or less.

Projects with a total capital cost of under $250 million that request $75 million in Section 5309 funds can benefit in several ways. Ideally, the total project cost would be $150 million or less so that the federal share can still reach 50 percent. As noted earlier, Small Start projects can be implemented more quickly, partially because the federal process is somewhat less rigorous. This provides quicker realization of project benefits and reduces the impact of inflation on project capital costs.

Also noted earlier, the FTA evaluation process has evolved in a manner that favors projects with a large number of short trips over those with a smaller number of longer trips. This effectively makes longer systems with commuter rail operating characteristics less attractive. The Small Starts projects can offset this bias to some extent since the environmental benefits and the cost effectiveness consider only the federal capital request rather than the total cost, and do not include the operating costs. This allows Small Starts projects to increase service frequency (and operating costs) in order to attract higher ridership without increasing the cost component of the evaluation. The financial plan must still consider the total costs, however. It may be prudent to evaluate projects that are eligible for Small Starts under both Small and New Starts scenarios.

HDR