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AMEREN MISSOURI

Montgomery-Callaway Connector Project

Routing Study

PROJECT NO. 171065

JUNE 10, 2025

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List of Abbreviations

Abbreviation	Term/Phrase/Name
Ameren	Ameren Missouri
ACS	American Community Survey
CDP	census designated place
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
IPaC	Information for Planning and Consultation
kV	kilovolt
MBP	Missouri Bat Programmatic
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
NHD	National Hydrography Dataset
MISO	Midcontinent Independent System Operator
NLCD	National Land Cover Data
NOI	Notice of Intent
NPS	National Park Service
NRHP	National Register of Historic Places
NRIS	National Register Information System
NWI	National Wetland Inventory
ROW	right-of-way
SHPO	State Historic Preservation Office
SWPPP	stormwater pollution prevention plan
USACE	U.S Army Corps of Engineers
USCB	U.S Census Bureau
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

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1.0 Introduction

A recent study by the Midcontinent Independent System Operator (MISO) revealed the need for significant system upgrades in the region to handle an increase of approximately 1,500 megawatts of new, third-party generation. Federal regulation requires Ameren to meet these needs and provide access to our transmission system. To meet MISO needs and strengthen the safety and reliability of the region's energy grid, Ameren Missouri (Ameren) plans to construct a new double-circuit electrical transmission line between the Burns Substation in Callaway County and the Montgomery Substation in Montgomery County, Missouri.

1.1 Project Description

Ameren is working to build a more reliable and resilient energy grid for the future. Ameren's Montgomery-Callaway Connector Project ("Project") includes siting, constructing, operating, and maintaining one, approximately 30-mile, double circuit 345 kilovolt (kV) transmission line from the existing Montgomery Substation in Montgomery County to the existing Burns Substation in Callaway County, Missouri. The proposed Project also includes upgrades of both Ameren's existing substations.

The Project will utilize galvanized steel monopole structures (Figure 1-1) ranging from 110-150 feet in height based on site-specific conditions. The average span length between each transmission structure will be approximately 750-1,000 feet, averaging about 5-7 structures per mile. A 150-foot right-of-way (ROW) will be required to accommodate the Project.

1.2 Overview of Route Study Process

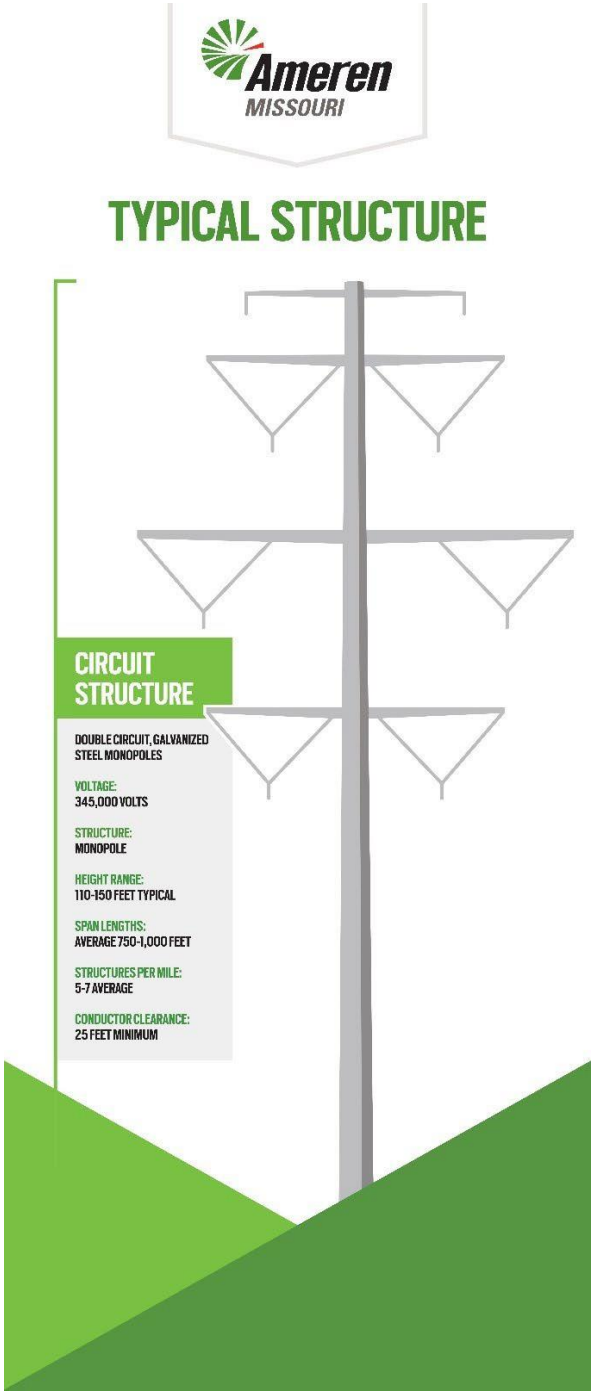
A routing study is a multi-step process designed to use various resources and inputs to narrow a broad study area containing numerous route options to a recommendation for the construction and operation of the proposed transmission line. The routing study process includes:

- Acquisition and mapping of natural, social, and environmental resource data
- Development of a study area
- Development of route network
- Field investigation of the route network
- Refinement of the route network
- Analysis of the refined route network
- Selection of the Proposed Route

The following chapters review each of the steps in the routing study and provide context and justification for the Proposed Route.

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Figure 1-1: Typical 345/345 kV Double Circuit Transmission Structure



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2.0 Development of Route Alternatives

The following section includes a description of the study area and specifics regarding the resources within it. Also included in this section is information about agency coordination, a description of the route segment network, and description of the route refinement process.

2.1 Development of the Study Area

The study area was designed to provide an area within which numerous potential route options could be developed without being so large as to burden the analysis (Figure 2-1). The study area was developed both to provide direct routes between the endpoints and to provide flexibility for the development of route options. The presence and location of existing infrastructure corridors in the area that could be used were identified and considered as part of defining the study area. Major features considered in developing the boundaries of the study area for the Project are listed below:

- Burns Substation
- Montgomery Substation
- US Interstate 70 (east/west)
- US Highway 54 (north/south)
- Multiple outdoor recreation areas (Whetstone Creek Conservation Area, Graham Cave State Park, Prairie Fork Conservation Area)
- The municipalities of New Florence, Kingdom City, and Montgomery City

The study area is in the east-central portion of Missouri within Callaway and Montgomery counties. The study area extends east/west approximately 29 miles from Montgomery Substation to Burns Substation. The study area extends north/south approximately 13 miles at the widest portion of the study area.

2.2 Description of the Study Area

The study area is in east-central Missouri, approximately 18 miles east of Columbia, Missouri. The study area includes portions of Montgomery and Callaway Counties. The study area includes all or portions of Kingdom City Village, New Florence City, Montgomery City, and Danville (census designated place, CDP). These communities include dense residential development, commercial and business areas, schools, religious institutions, and industrial areas. Outside of these cities and communities, the study area is predominantly undeveloped forested lands and agricultural land. Interstate 70 runs east-west throughout the southern portion of the study area. There are multiple conservation and state managed lands including Prairie Fork Conservation Area, Whetstone Creek Conservation Area, Graham Cave State Park, and Danville Conservation Area. The following sections include more detailed information regarding natural and human-made resources in the study area.

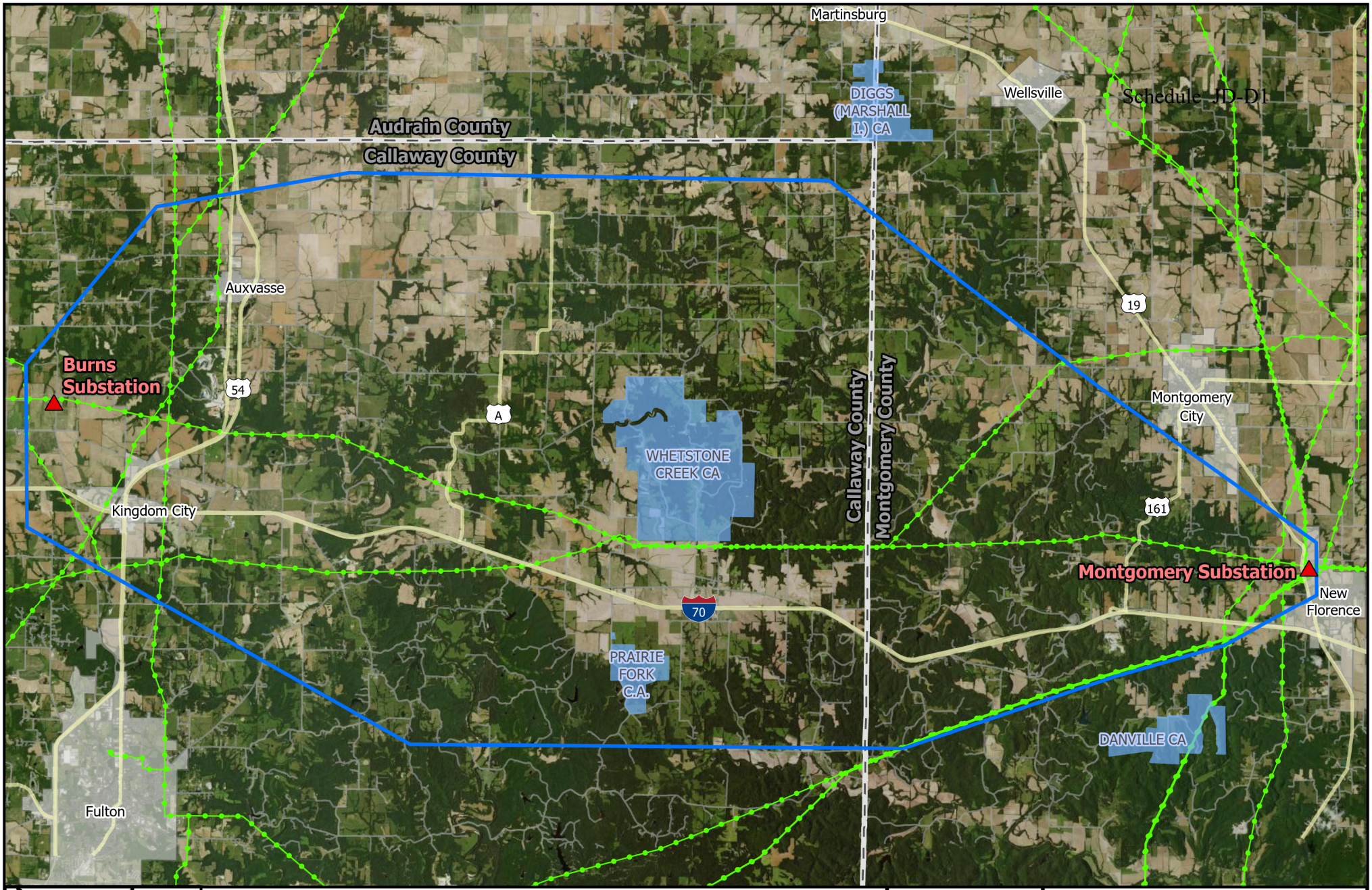


Figure 2-1
Ameren Missouri
Montgomery - Callaway
Connector Project
Study Area Map

Source: ESRI, NAIP, EIA, Census, Ameren, Burns & McDonnell

Issued: 6/10/2025

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2.2.1 Natural Resources

2.2.1.1 Topography

There is a range of topography throughout the study area given how large it is. Generally, the southern and eastern portion of the study area has more valleys and shifting topography than the northern portion of the study area. When there are significant topographical variations it can create design, maintenance, and access issues for the construction and maintenance of a transmission line. The region has some cuestas (asymmetric hills where one side has a gentle slope and one side has a steep slope) and low hills. There are multiple bedrock types found in the study area; of these bedrock types there are four associated geological ages: Devonian, Mississippian, Ordovician, and Pennsylvanian (MDNR (2), 2022). A majority of the geology in this region is from the Pennsylvanian age including sandstone, shale, limestone, and coal (Griffith, 2010).

2.2.1.2 Water Resources

There are numerous water resources throughout the study area including rivers, lakes, creeks, and drains. Larger streams include Auxvasse Creek, Bachelor Creek, Whetstone Creek, Loutre River, Little Loutre Creek, and Harrison Creek. Larger lakes include Leisure Lake, Guthrie Lake, Eugene Hooks Lake, Don Woods Lake, and Pierson Lake.

There are ten Missouri Department of Conservation (MDC) managed lakes in the study area. The McCredie Farm Lake is a 12-acre lake owned and maintained by the University of Missouri and is located approximately 1.5 miles northeast of Kingdom City. Other MDC-managed lakes are found in the Whetstone Creek Conservation Area, such as Big Lake, Windy Lake, North Lake, and Horseshoe Lake. There are also several MDC-managed ponds in the study area, eight of which are in the Whetstone Creek Conservation Area, and three of which are in the south-central portion of the study area.

There is one 303d listed impaired stream that intersects the study area; South Fork Salt River (WBID 142) extends 0.13 miles into the study area in its northwest corner, near Auxvasse. The impaired portion of the stream ends approximately 2.2 miles from the nearest route segment. The stream is listed for impairment to dissolved oxygen (MDNR, 2022). No other 303d or 305b impaired rivers or lakes are located within the study area.

2.2.1.3 Vegetation

The study area lies within the Central Irregular Plains ecoregion, which encompasses parts of Missouri, Iowa, Kansas, and Oklahoma. This ecoregion is historically characterized as a “grassland/forest mosaic,” with forested areas occurring along streams (Griffith, 2010). The prominent vegetation in this ecoregion includes tallgrass prairie with little bluestem, big bluestem, switchgrass, and Indiangrass, and some oak-hickory woodlands with red oak, white oak, bur oak, chinkapin oak, post oak, shagbark hickory, and bitternut hickory (Griffith, 2010).

According to the National Land Cover Dataset (NLCD), deciduous forest is the dominant land use type, comprising 67,233 acres of the study area. Pasture/hay and cultivated crops are the next most common land use type, comprising 43,416 acres and 41,564 acres respectively (MRLC, 2023). See section 2.2.2.2 Land Use for additional information.

2.2.1.4 Wildlife

The study area includes a mosaic of different land uses, vegetation communities, and habitat types that support a wide variety of wildlife species. The study area is situated between two regions: Interior River Valleys and Hills and Central Irregular Plains (Griffith, 2010). Common wildlife in these two regions includes white-tailed deer, badger, weasel, raccoon, skunk, muskrat, cottontail rabbit, mink, Canada goose, bobwhite quail, western meadowlark, Carolina chickadee, ring-neck pheasant, redback salamander, copper belly water snake, eastern box turtle, paddlefish, and various darters.

As part of the Missouri Bat Programmatic (MBP) informal consultation framework, the U.S. Army Corps of Engineers (USACE), in partnership with U.S. Fish and Wildlife Service (USFWS), has defined three bat zones to evaluate the impacts of actions taken within the state of Missouri. Zone 3 conservation measures apply to actions that occur within 0.25 miles (radius) of a known roost tree or hibernacula, Zone 2 conservation measures apply to actions within 5.0 miles (radius) of a known roost tree or hibernacula, and Zone 1 applies to areas outside of Zone 2 and Zone 3. 70.2 percent of the study area is classified as Zone 1, while 29.8 percent is classified as Zone 2—one contiguous area located exclusively in the western half of the study area, primarily falling east of Kingdom City, south of Auxvasse, west of Bachelor, and extending south of Calwood (USACE, 2019).

2.2.1.5 Threatened and Endangered Species

The Endangered Species Act of 1973 affords legal protection to those species and their habitats determined to meet the specified criteria for listing by the Federal government as either threatened or endangered. Federally listed threatened species are those species likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Federally listed endangered species are those species already in danger of extinction throughout all, or a significant portion of, their range.

The study area was put into the Information for Planning and Consultation (IPaC) tool from USFWS to determine listed species that could potentially occur in the study area and any designated critical habitat. According to USFWS, three federally listed endangered species, no threatened species, and one each of proposed endangered and candidate species are known or likely to occur within the study area (Table 2-1; Appendix A).

Table 2-1: Threatened and Endangered Animal Species

Class	Common Name	Scientific Name	Status
Mammals	Gray bat	*Myotis grisescens*	Endangered
	Indiana bat	*Myotis septentrionalis*	Endangered
	Northern long-eared bat	*Myotis septentrionalis*	Endangered
	Tricolored bat	*Perimyotis subflavus*	Proposed Endangered
Insects	Monarch Butterfly	*Danaus plexippus*	Proposed Threatened
	Western Regal Fritillary	*Argynnis idalia occidentalis*	Proposed Threatened

Source: USFWS, 2025. IPaC

2.2.1.6 Protected Lands

Throughout the study area, there are multiple protected lands and conservation resources – one of the most prominent being Whetstone Creek Conservation Area. Other conservation areas include the Prairie Fork

Conservation Area and the Danville Conservation Area. There are three state recreation areas - Graham Cave State Park, Loutre Lick Access, and Moore's Mill Access.

2.2.2 Social Resources

2.2.2.1 Demographics

The study area includes portions of Callaway and Montgomery Counties. Callaway County had an estimated population of 44,517 (0.7% of Missouri) and Montgomery County had an estimated population of 11,421 (0.1% of Missouri) (U.S Census Bureau [USCB], 2022).

For comparative purposes, the estimated 2022 American Community Survey (ACS) 5-year Data Profile population characteristics for counties within the study area and the State are provided below in Table 2-2.

Table 2-2: Demographics - American Community Survey 2018-2022

Data	Callaway County	Montgomery County	Missouri
2022 Population	44,517	11,421	6,154,422
White (percent)	90.3%	93.6%	79.4%
Black or African American (percent)	4.3%	1.7%	11.3%
American Indian and Alaskan Native (percent)	0.4%	0.5%	0.3%
Asian (percent)	0.1%	0.2%	2.1%
Native Hawaiian and Other Pacific Islanders	0.2%	0.0%	0.1%
Some Other Race	0.5%	0.3%	1.5%
Two or More Races	4.2%	3.7%	5.4%

Source: USCB ACS 5-Year Data Profile, 2022

Table 2-3 provides employment data for counties within the study area (USCB, 2022). Callaway County has the highest unemployment percentage at 5.2% percent. The top industries in these countries are educational services, health care, and social assistance (USCB, 2022).

Table 2-3: Employment Data: American Community Survey 2018-2022

Data	Callaway County	Montgomery County	Missouri
Population 16 years and over	36,425	9,188	4,940,395
In labor force	21,750	5,286	3,107,514
Employed (Civilian Labor Force)	20,583	5,130	2,954,860
Unemployed (Civilian Labor Force)	1,133	156	132,657
Armed forces	34	0	19,997
Not in labor force	14,675	3,902	1,832,881

Data	Callaway County	Montgomery County	Missouri
Percent unemployed (civilian labor force)	5.2%	3.0%	4.3%
Top Occupation	Management, business, science, and arts occupations	Management, business, science, and art occupation	Management, business, science, and art occupation
Top Industry	Educational services, and health care and social assistance	Educational services, and health care and social assistance	Educational services, and health care and social assistance

Source: USCB ACS 5-Year Data Profile, 2022

Table 2-4 provides housing data for the counties within the study area. Montgomery County has the highest poverty rate when compared to all counties reviewed and the State of Missouri, and had the lowest median household income (USCB, 2022).

Table 2-4: Housing Demographics

Data	Callaway County	Montgomery County	Missouri
Owner-occupied housing unit rate 2018-2022 (percent)	77.3%	74.3%	67.6%
Median value of owner-occupied housing units (2018-2022)	$184,300	$162,200	$199,400
Persons in Household	2.59	2.48	2.56
Median household income (2018-2022)	$70,599	$58,660	$65,920
Persons in poverty (percent)	9.5%	14.8%	12.8%

Source: USCB 5-Year Data Profile, 2022

2.2.2.2 Land Use

The study area is approximately 254 square miles (162,601 acres) and includes portions of Callaway and Montgomery Counties. Most land use in the study area is devoted to deciduous forest (Table 2-5). Forested land (deciduous forest, evergreen forest, and mixed forest) comprises approximately 72,510 acres of the study area, while approximately 8,599 acres include developed land (developed open spaces such as roads to high-intensity development such as cities). Approximately 952 acres of grassland or herbaceous areas are found within the study area (MRLC, 2023). Other land cover includes open water, barren land, and wetlands.

Table 2-5: Land Use Type Table

Land Type	Approximate Acres in Study Area (acres)	Percentage of Study Area
Deciduous Forest	67,233	39.70%

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Land Type	Approximate Acres in Study Area (acres)	Percentage of Study Area
Pasture/Hay	43,417	25.48%
Cultivated Crops	41,565	24.08%
Mixed Forest	4,981	3.01%
Developed, Open Space	4,325	2.50%
Developed, Low Intensity	2,789	1.53%
Woody Wetlands	1,408	0.85%
Developed, Medium Intensity	1,307	0.71%
Open Water	1,201	0.70%
Grassland/Herbaceous	952	0.56%
Barren Land (Rock/Sand/Clay)	496	0.30%
Shrub/Scrub	396	0.24%
Evergreen Forest	296	0.18%
Developed, High Intensity	178	0.10%
Emergent Herbaceous Wetlands	112	0.07%
Total	**170,655**	100%

Source: NLCD, (MRLC, 2023)

2.2.2.3 Agriculture

Agriculture is one of the dominant land uses throughout the study area. As shown in Table 2-6, farmland (pasture/hay and cultivated crops) comprises approximately 50% of both Project counties. According to the 2022 Census of Agriculture, Callaway County's top crops in acres include soybeans and forage (U.S. Department of Agriculture, USDA). Montgomery County's top crops in acres include soybeans and corn (USDA, 2022). The top five crops within each Project County, as well as how many acres they occupy, are shown in Table 2-7.

Table 2-6: Percentage of Farmland by County

County Name	Total County Land (square miles)	Total Farmland (square miles)	Percentage of Farmland
Callaway County	834.6	451.6	54.1%
Montgomery County	542	309.5	57.1%

Table 2-7: Top Crops by Acres for Project Counties

Crop Type	Callaway County (acres)	Montgomery County (acres)
Soybeans for beans	52,107	62,588
Forage (hay/haylage), all	34,350	14,315
Corn for grain	19,603	38,834
Wheat for grain, all	6,024	5,997
Sorghum for grain	837	836

2.2.2.4 Transportation

Major transportation networks and roadways within the study area include Interstate 70, which extends east to west across the southern portion of the study area (Figure 2-1). U.S. Highway 54 runs north to south, bisecting Kingdom City in the western portion of the study area. A small portion of State Highway 19 extends north to south through the eastern portion of the study area adjacent to the Montgomery Substation.

Two railroads intersect the study area. The Illinois Central Gulf Railroad runs north-south in the western corner of the study area, travelling through Auxvasse and Kingdom City; this railroad is crossed by all potential routes. The Norfolk and Western Railroad crosses the easternmost corner of the study area, running northwest-southeast through Montgomery and New Florence, just past the eastern border of the Montgomery Substation; none of the route segments cross this railroad.

According to the Federal Aviation Administration (FAA), there are four registered airports in the study area, Table 2-8 lists all airports in the study area. No airports are public airports.

Table 2-8: Airport in the Study Area

Airport Name	Airport ID	Airport Type
Flying Shamrock	6MU4	Private
SKY-VU	MO45	Private
Redgate Ranch	11MO	Private
Flying V Ranch	10MO	Private

2.2.2.5 Existing Utilities

There are numerous existing utilities throughout the study area. One Ameren-owned transmission line, McCreadie to Montgomery (345 kV), travels east to west—bisecting the study area. Table 2-2 below provides a list of known existing transmission lines within the study area. According to publicly available data, there are no pipelines in service within the study area.

Table 2-9: Existing Transmission Lines

Transmission Line Name	Voltage	Line Direction
McCreadie to Montgomery	345 kV	East/West
Kingdom City to Williamsburg	161 kV	East/West
Williamsburg to Montgomery City	161 kV	East/West
Montgomery City to Chamois	69 kV	North/South
Montgomery to Big Springs Secondary	69 kV	North/South
Guthrie to Montgomery	161 kV	North/South
Montgomery to Unknown	115 kV	North/South
Callaway (MO) to Montgomery	345 kV	North/South
Montgomery to Big Springs Primary	161 kV	North/South
Spencer Creek to Montgomery	345 kV	North/South
Callaway (MO) to Auxvasse	69 kV	North/South
Guthrie to Unknown	138 kV	North/South

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Transmission Line Name	Voltage	Line Direction
McCredie to Kingdom City	354 kV	North South

2.2.2.6 Commercial and Residential Development

Commercial and residential development is concentrated in the larger municipalities located in the study area, such as Auxvasse and Kingdom City. The City of Auxvasse, located west of the intersection of US Highway 54 and State Road B, has the highest concentration of residential buildings in the study area and a 2022 population of 1,286. The Village of Kingdom City is located at the intersection of I-70 and Highway 54 and had a 2022 population of 126 (USCB, 2022). As a result of its location, much of the development in the area supports the service industry—including gas stations and convenience stores, restaurants, and lodging accommodations. Other residential development is dispersed sporadically throughout the study area, with smaller concentrations surrounding towns like Calwood, Williamsburg, and Danville. Outside of Kingdom City, commercial development is sparse in the study area, with Auxvasse, Danville, and Williamsburg serving as other commercial hubs.

2.2.2.7 Cultural Resources

There are two National Register of Historic Places (NRHP) sites listed in the study area. Graham Cave (National Register Information System (NRIS) Reference Number 66000420) is located within Graham Cave State Park 0.5 miles north of Mineola. Archaeological excavations beginning in 1949 revealed evidence of human habitation dating back as far as 10,000 years ago, providing insight into the lifestyles of Archaic period Native Americans and their adaptation to post-ice age environments. The Baker, Sylvester Marion, and Frances Anne Stephens House (NRIS Reference Number 99001018) is located at 60 Boonslick Rd. in Montgomery City. Both NRHP-listed locations in the study area occur along I-70 and are approximately 1.5 miles from the nearest route segment (NPS, 2024). Additionally, a review of the State Historic Preservation Office (SHPO) archeological and Historical Geographic Information System (GIS) data was performed. This data was used for the Archeological sites within the ROW analysis factor discussed further in section 3.2.3.

2.3 Route Segment Network

After the data-gathering process and identification of the study area, the routing team identified potential route segments throughout the study area, totaling 85 segments that combine to create 721 unique routes (Figure 2-2). Following the identification of potential alternative routes, a field investigation was conducted to confirm the data gathered in the initial steps of the routing study. From here, a set of key criteria were quantified to reduce and refine the route network. The criteria utilized were the total length of the line, heavy angles, forested land within the ROW, wetlands in the ROW, and number of residents within 500 feet of the route.

This analysis used the z-score method to manage and review the raw data produced. The z-score method is based on the relationship of a route's impact to the mean value for the set of routes. With z-score analysis, a negative score means the route is below the mean for the factor. A positive score means the route is higher than the mean for that factor and has a greater impact than most other routes. The z-score analysis allowed the Project team to ultimately reduce the route network down to five geographically distinct routes (Figure 2-3) from among the 721 unique routes. No weights were applied to the z-score analysis, and the z-score was developed based only on the raw data of the route study.

During the initial analysis, the Project team determined that routes in the southern portion of the study (south of I-70) would require crossing I-70 multiple times, increased the potential to impact protected lands and

would face topographic challenges that could likely impact construction, maintenance, cost, and the reliability of the transmission line; for these reasons they were excluded from further consideration. This resulted in the removal of segments 4, 10, 11, 12, 13, 18, 19, 20, 21, 27, 28, 29, 33, 36, 37, 38, 39, 44, 45, 48, 49, 50, 53, 58, 59, 60, 63, 64, 69, 70, 75, 76, 80, and 82 from further consideration and subsequently removed those route alternatives using any of these segments. The Project team reviewed the remaining segments and removed several additional segments due to those segments either being redundant or potentially more impacting than similar segments, which resulted in the removal of alternative routes using the removed segments. The route network was then narrowed down to the following five, geographically distinct route alternatives for further evaluation (see Figure 2-2):

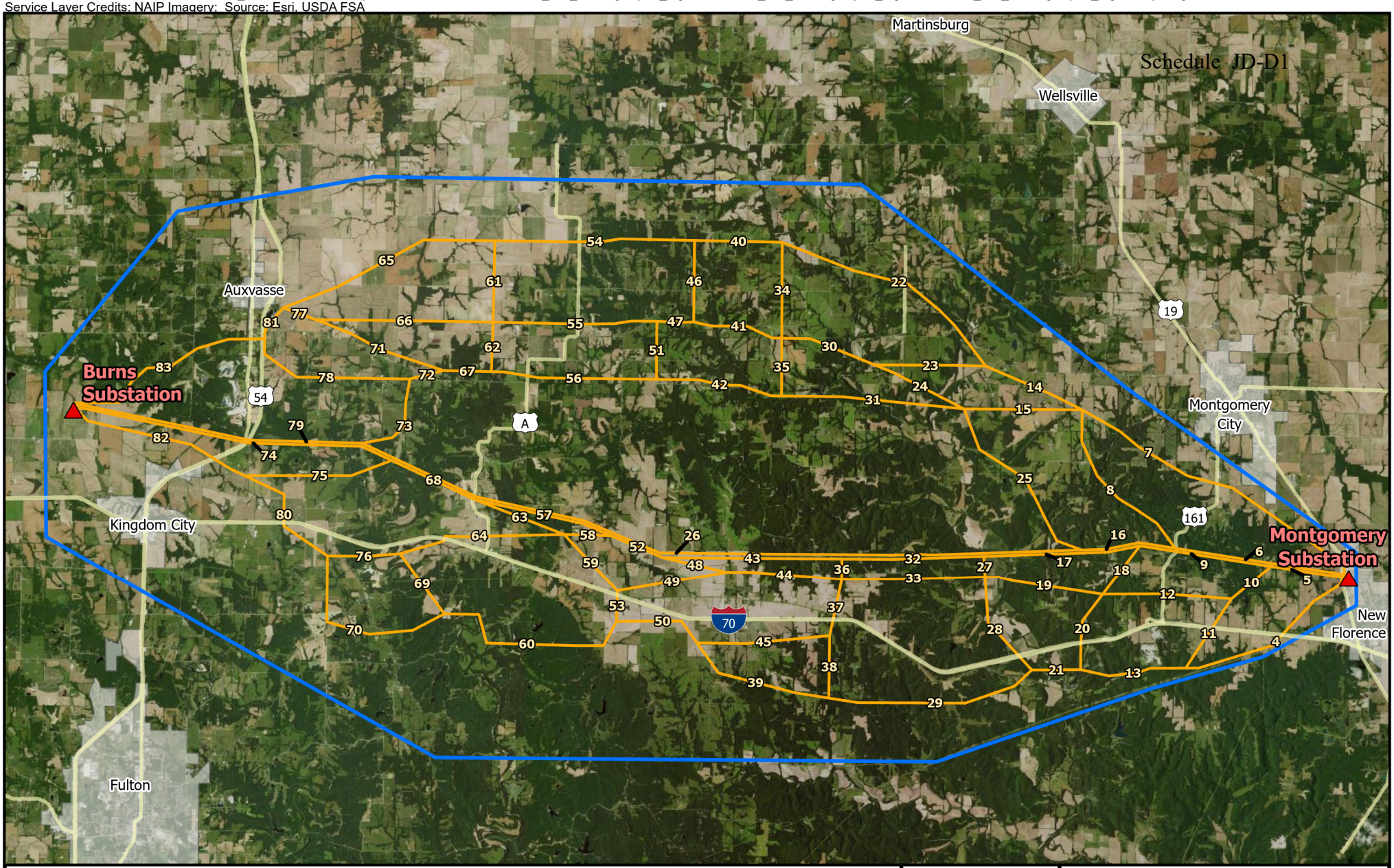
- Route 101 - segments 1, 2, 5, 9, 17, 32, 43, 52, 57, 68, 74, 85
- Route 601 - segments 1, 3, 7, 14, 22, 40, 54, 65, 81, 83, 84, 85
- Route 641 - segments 1, 3, 7, 14, 23, 30, 41, 47, 55, 66, 77, 81, 83, 84, 85
- Route 720 - segments 1, 3, 7, 15, 31, 42, 56, 67, 72, 73, 79, 84, 85
- Route 721 - segments 1, 3, 7, 15, 31, 42, 56, 67, 72, 78, 83, 84, 85

The above routes provided geographically distinct routes including an option (Route 101) that parallels the existing McCreadie – Montgomery 345 kV transmission line. There were modifications made to the remaining five routes. This included modifications to original Routes 601, 641, and 721. These adjustments were made to limit impacts on center pivot irrigation, residences, and the avoidance of a cemetery on Old U.S. Highway 54. Routes 101 and 720 were not modified. After these modifications, the final route network included 13 segments that combined to make 5 routes. The reduced route network, including the segments and the routes, were renumbered as follows (see Figure 2-3):

- Route 1 (originally Route 601) – segments 1, 2, 4, 7, 10, 11, 12, 13
- Route 2 (originally Route 641)– segments 1, 2, 4, 6, 10, 11, 12, 13
- Route 3 (originally Route 721) – segments 1, 2, 5, 9, 11, 12, 13
- Route 4 (originally Route 720) – segments 1, 2, 5, 8, 12, 13
- Route 5 (originally Route 101)– segments 1, 3, 13

Appendix B includes the analysis table for the z-score analysis performed initially for all 721 route alternatives before renumbering. Chapter 3 reviews the analysis performed on the reduced route network and how the Proposed Route was determined.

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Service Layer Credits: NAIP Imagery; Source: Esri, USDA FSA

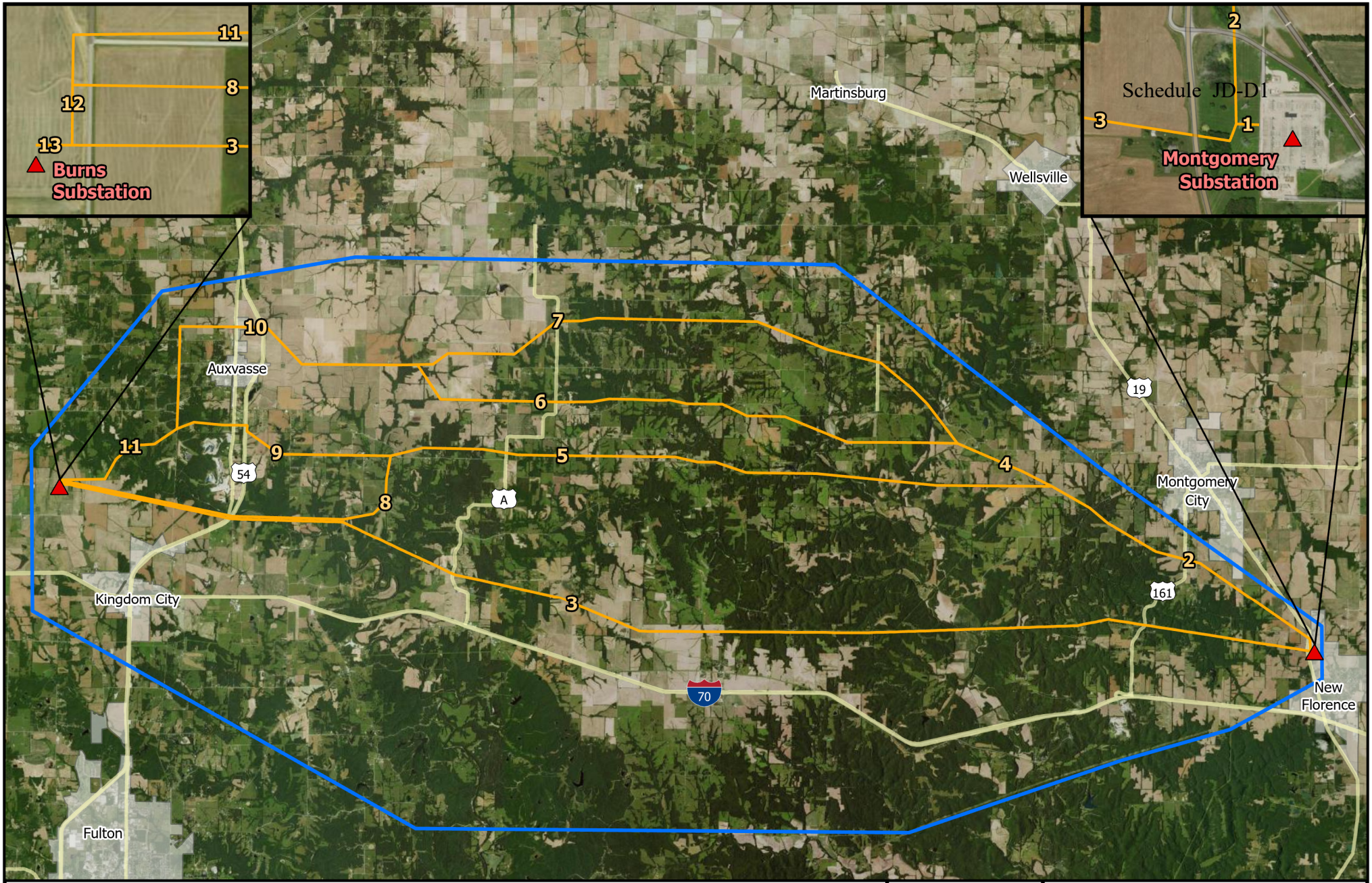


BURNS McDONNELL

Figure 2-2
Ameren Missouri
Montgomery to Burns
345-kV Transmission Line Project
Original Route Network

Source: ESRI, NAIP, Tiger/Line, US Census Ameren Missouri, Burns & McDonnell

Issued: 6/11/2025



Source: ESRI, NAIP, Tiger/Line, US Census, Ameren Missouri, Burns & McDonnell

Issued: 6/10/2025

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3.0 Evaluation of Route Alternatives

This section presents the rationale behind the route identification and evaluation process used for the Project, which resulted in the selection of a Proposed Route. The Project extends from the Burns Substation, northwest of Kingdom City to the Montgomery Substation southeast of Montgomery City.

3.1 Overview of the Routing Process

One of the first steps in the routing process is developing a study area. The limits of the study were established based on the identified endpoints (Burns and Montgomery Substation) provided by Ameren in conjunction with opportunities and constraints. Publicly available data, such as NRHP data, Federal Emergency Management Agency (FEMA) floodplains, National Hydrography Dataset (NHD), and NLCD data helped the routing team identify opportunities and constraints. Local, state, and Federal agencies were contacted early in the Project to obtain information relevant to the routing process. Using this data informed the development of the study area.

Once the study area was defined, the objective was to identify economically and technically feasible routes to connect the substation endpoints, while avoiding or minimizing impacts to social and natural resources. As discussed in section 2.3, over 700 routes were identified in the initial route creation process and were subsequently reduced to five geographically different routes. The reduced route network was then presented to the public in an open-house format to obtain public feedback and input on the routes. After reviewing the open house feedback, a robust set of evaluation criteria was created based on the various opportunities and constraints in the study area in conjunction with stakeholder and landowner feedback. The following sections detail the analysis and provide the recommended route.

3.2 Evaluation Factors

The route evaluation first consisted of comparing the potential routes based on specific evaluation factors. These factors address human and environmental factors, cost, and engineering feasibility. Selected factors can be divided into three categories: engineering, social, and environmental. The route factors used in the evaluation are provided below in **Table 3-1**.

Table 3-1: Evaluation Criteria

Categories	Evaluation Factors
Engineering	Total Length (miles)
	Heavy Angles (>40 degrees) (count)
	Road Crossings (count)
	Length Not Along Roads (miles)
	Number of Pipeline Crossings (count)
	Length Not parallel Existing Transmission Line (miles)
	Transmission Line Crossings (count)
Environmental	Wetlands within ROW (acres)
	Length through Bat Zone 2 (feet)
	Length through Bat Zone 3 (feet)

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Categories	Evaluation Factors
	River/Stream/Waterbodies within the ROW (count)
	Waterbodies within the ROW (count)
	Floodplain in ROW (acres)
	Floodway in ROW (acres)
	Woodlands within ROW (acres)
Social	Historical/NRHP Districts or Sites within 1,320 ft (count)
	Archaeological Sites within the ROW (count)
	*Residences within 100 ft of centerline (count)
	*Residences within 101 – 300 ft of centerline (count)
	*Residences within 301 – 500 ft of centerline (count)
	Residence Proximity Score (score)
	Landowners within ROW (count)
	Length Not Along Parcel Boundary (miles)
	Businesses within 300 ft (count)
	Industrial Facilities within 100 ft of centerline (count)
	Public Facilities within 500 ft of centerline (count)
	Public lands within 500ft of Centerline (count)
	Grasslands/Pasture within ROW (acres)
	Cropland within ROW (acres)
	Center-Pivot Irrigation within 100 ft of Centerline (count)

*Internal factor for residential proximity

3.2.1 Engineering Factors

Engineering factors include:

1. **Total Length** provides a general indicator of the overall presence of the Project. Greater length suggests greater social and environmental impacts and overall cost, assuming all other factors are equal.
2. **Number of Heavy Angles** (angles greater than 40 degrees) was considered because these angles typically require larger structures and foundations and, consequently, more space. These structures tend to be more visible and more expensive. Off-ROW easements for pulling conductor may also be necessary at these angle locations.
3. **Road Crossings** provide an indicator of potential permitting and/or line-crossing issues that may require special designs or additional permits.
4. **Length Not Along Roads** is measured because following roads is preferred where there is little or no adjacent development. In general, following roads is not as preferable as co-locating with existing transmission lines because there are fewer above-ground facilities associated with roads that have already affected the visual environment.
5. **Number of Pipeline Crossings** is calculated to provide engineers with a rough estimate of where permits and special designs may be needed to avoid impacting large-diameter pipelines.
6. **Length Not Along Existing Transmission Line** is measured because following existing transmission lines is generally considered to have less impact than a new ROW. Because it is desirable and less

impacting to co-locate a new route along an existing transmission line, potential impacts would be more likely to occur where a route would be built away from the existing line. Therefore, length not along existing transmission lines is measured.

7. **Transmission Line Crossings** is measured because it provides an indicator of potential line- crossing issues that may require special designs or additional considerations such as line outages.

3.2.2 Environmental Factors

Environmental factors include:

1. **Wetlands within ROW** are calculated using National Wetland Inventory (NWI) data produced by USFWS. Wetlands within the ROW represent areas where additional permitting would be necessary as well as where there could be constraints on structure locations.
2. **Length through Bat Zone 2** uses data from USACE and USFWS to identify what length of the potential routes cross identified Bat Zone 2 areas under the MBP informal consultation and may require further permitting and design considerations. Zone 2 conservation measures apply to actions within 5.0 miles (radius) of a known roost tree or hibernacula.
3. **Length through Bat Zone 3** uses data from USACE and USFWS to identify what length of the potential routes cross identified Bat Zone 3 areas under the MBP informal consultation. These areas may require further permitting and design considerations. Zone 3 conservation measures apply to actions that occur within 0.25 miles (radius) of a known roost tree or hibernacula.
4. **River/Streams/Waterways Crossed** is measured to capture the potential impact of crossing both perennial and intermittent streams based on NHD data. Additional permitting may be required at stream crossings for the transmission line and access roads, if needed.
5. **Waterbodies within ROW** will also be measured using NHD data to identify and evaluate waterbodies other than the NHD streams.
6. **Floodplains within ROW** is calculated using FEMA floodplain data (1% annual flood chance and 0.2 annual flood chance). Additional permits and design considerations may be required when siting structures or access roads through floodplains.
7. **Floodway in ROW** is calculated using FEMA floodplain data, specifically Regulatory Floodway data. A regulatory floodway is a river or watercourse that is regulated to avoid increasing water surface elevation more than the designated height. Additional permits and design considerations may be required when siting structures or access roads through floodways.
8. **Woodland within ROW** is determined using NLCD digital data and NAIP Natural Color Infrared imagery to determine likely signatures of woody vegetation. Woodland within the ROW represented the forested areas within the ROW that would be cleared along each route.

3.2.3 Social Factors

Social factors include:

1. **Historical/NRHP Districts or Sites within 1,320 ft** were identified using the (National Park Service) NPS NRHP database.
2. **Archeological Sites within the ROW** were identified via online data maintained by the Missouri SHPO. Much of the study area has not been surveyed, and as a result there is a likelihood that additional sites could be encountered during ground surveys of the Proposed Routes.
3. **The Residential Proximity Score** comprises three residential proximity measurements weighted and summed together to give an overall residential proximity score for each route alternative. Each

of the three measurements is assigned a weight internally, giving different sensitivity levels for different distance zones. The overall weight for the Residential Proximity Score is 10. Along the route options, residences included single-family homes within each distance category. Homes were initially identified using aerial imagery in GIS. Home locations were then confirmed during the field visit to the study area. **Residences within 100 feet** included the total number of habitable residences within 100 feet from the centerline of each route option. The internal weight for residents within 100 ft is 5. **Residences within 101 - 300 feet** of the centerline included the total number of habitable residences between 101 to 300 feet from the centerline of each route option. The internal weight for residences within 101 - 300 feet is 3. **Residences within 301 – 500 feet** of the centerline included the total number of habitable residences between 301 – 500 feet from the centerline of each route option. The internal weight for residences within 301 – 500 feet is 1.

4. **Landowners within ROW** was counted using parcel boundaries obtained from Montgomery and Callaway Counties. This factor measures the total number of landowners within the ROW (75 feet on either side of the transmission centerline).
5. **Length not along parcel boundary** is measured because following existing parcel boundaries is generally considered to have less impact than a new ROW across the center of a parcel. Because it is desirable and less impacting to locate a new route along a parcel boundary, potential impacts would be more likely to occur where a route would be built away from the parcel boundary, so the length not along the parcel boundary will be measured.
6. **Businesses within 300 feet** are quantified from businesses that were documented during the field review of the routes. This count does not include agricultural operations.
7. **Industrial Facilities within 100 ft of centerline** generally include warehouses, manufacturing buildings, and solar facilities.
8. **Public facilities within 500 feet** are calculated to quantify the potential impact of the line on areas frequented by numbers of people, including schools, religious facilities, parks, and other areas where people may gather, as identified in ESRI or Geographic Names Information System (GNIS) data and from the field review of the routes.
9. **Protected lands within 500 ft of centerline** are calculated because crossing these lands will require coordination with agencies and will likely entail extensive permitting requirements.
10. **Grasslands/Pasture within ROW** is calculated using the grasslands and pasture classification of NLCD data measuring the proposed new ROW impacting grasslands and pasture.
11. **Cropland within the ROW** is calculated using the croplands classification of NLCD data measuring the proposed new ROW impacting croplands.
12. **Center-Pivot Irrigation (CPI) within 100 ft of centerline** measures the number of CPIs within 100 feet of the centerline as determined by recent aerials photography, field review and information collected from the public.

3.3 Weighting the Route Factors

The above categories were considered representative of the potential impacts from construction and operation of the new transmission line within this study area. Burns & McDonnell assigned weights to each of the factors based on public feedback, input from Ameren, and Burns & McDonnell experience with transmission line projects across the region. The weights associated with each routing factor are presented in Table 3-2.

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Table 3-2: Routing Factor Weight

Evaluation Factors	Unit of Measure	Weight
Engineering		
Total Length	Miles	1
Heavy Angles (>40 degrees)	Count	5
Road Crossings	Count	3
Length Not Along Roads	Miles	3
Number of Pipeline Crossings	Count	1
Length Not parallel Existing Transmission Line	Miles	3
Transmission Line Crossings	Count	2
Environmental		
Wetlands within ROW	Acres	6
Length through Bat Zone 1	Feet	8
Length through Bat Zone 2	Feet	5
River/Stream/Waterbodies within the ROW	Count	1
Waterbodies within the ROW	Count	2
Floodplain in ROW	Acres	3
Floodway in ROW	Acres	5
Woodlands within ROW	Acres	7
Social		
Historical/NRHP Districts or Sites within 1,320 ft	Count	4
Archaeological Sites within the ROW	Count	2
Residences within 100 ft of centerline	Count	5*
Residences within 101 – 300 ft of centerline	Count	3*
Residences within 301 – 500 ft of centerline	Count	1*
Residence Proximity Score	Score	10
Landowners within ROW	Count	0
Length Not Along Parcel Boundary	Miles	2
**Businesses within 300 ft	Count	2
Industrial Facilities within 100 ft of centerline	Count	4
Public Facilities within 500 ft of centerline	Count	6
Protected Lands within 500 ft of centerline	Count	4
Grasslands/Pasture within ROW	Acres	1
Cropland within ROW	Acres	5
Center-Pivot Irrigation within 100 ft of Centerline	Count	7

*internal factor weight

**does not include agricultural operations

The range of weights (1-10) was determined by the number of factors; the relative importance of each factor in relation to the others, consideration to the public responses, and the need to differentiate among the routes. Weights allow the evaluation to be more sensitive to certain concerns in the Project area. Higher

weights are placed on factors that are considered the most influential. For example, the highest weight used in this analysis is 10 for the residential proximity score and parallels the public input on what is considered the most important of the various factors. Below is a summary of responses received from the open house process regarding what factors the public found most and least important.

Open house participants were asked to rate the importance of various factors in determining the route of the transmission line. The top concerns (ranked as most important) included:

- Maximizing distance from homes (80%)
- Minimizing crossing of wetlands and floodplains (63%)
- Minimizing crossing of cropland/aquaculture areas (48%)
- Maximizing distance from historic/cultural sites (41%)
- Maximizing distance from conservation areas (37%)
- Minimizing total length and number of angles to reduce cost (33%)
- Maximizing routing along roads/railroads (32%)
- Maximizing routing along other utility corridors (30%)

Less critical factors included minimizing the total length, cost of the transmission line, and maximizing distance from conservation areas.

- Minimizing total length and cost of the transmission line (3.28%)
- Maximizing routing along roads or railroads (3.26%)
- Maximizing distance from conservation areas (3.65%)

Public and agency involvement was incorporated throughout the Project including virtual agency meetings and open houses to gather community input on the proposed route network. Chapter 5 provides more details of the public and agency outreach conducted for the project.

3.4 Results of Evaluation

Once each of the evaluation factors was quantified for each of the alternative routes, the evaluation of the 345 kV route alternatives utilized a minimum–maximum ranking system. The minimum–maximum ranking approach is best suited for the evaluation of a smaller number of route alternatives, such as the five routes evaluated for this Project. This approach uses a proportional distribution between the minimum and maximum values and results in a score between 1 and 5. Scores in the upper ranges would be those with greater relative impacts. Scores of 1 would be the least impacting value for a factor. The scores for each evaluation factor are summed to result in a total route score that can be compared with all other routes. The minimum-maximum rank of each factor is then multiplied by its assigned weight and then summed across all factors for each route alternative to provide an overall score for each route.

Five potential routes were identified and evaluated that would connect the Burns Substation to the Montgomery Substation. To identify a Proposed Route alternative, all five identified potential routes were examined. Each of the five routes was assigned a score between 1 (least impacting) and 5 (most impacting) based on the raw route data, which equates to the proportional distribution between the minimum and maximum values for each route factor. If two or more routes shared the same value, the tied values received the average rank of the tied position.

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Table 3-3 shows the route data for the five routes. The resultant weighted scores for these five routes were sorted and are shown in Table 3-4. The route data, unweighted minimum-maximum scores, and weighted sorted minimum-maximum rank tables for all routes evaluated are presented in Appendix C for reference.

The minimum-maximum analysis used for the 345 kV alternatives allowed the routes to be screened and compared using the quantifiable route factor values. The route selection process included this systematic analysis of the alternatives, combined with an understanding of the circumstances in the study area and the public input received. Table 3-4 presents the weighted, sorted minimum-maximum scores for the five routes in consideration, sorted from lowest to highest value. A lower total value generally indicates fewer overall impacts, while a higher value typically indicates greater impacts.

Table 3-3: Route Data

Route	Segments	Total Length (miles)	Heavy Angles (> 40 degrees) (number)	Road Crossings (number)	Length Not Along Roads (miles)	Length Not Parallel Existing T-Line (miles)	T-Line Crossings (number)	Wetlands within ROW (acres)	Length through Bat Zone 2 (feet)	River/ Stream/ Waterways Crossed (number)	Waterbodies within the ROW (number)	Floodplain in ROW (acres)	Woodlands within ROW (acres)	Archaeological Sites within ROW (number)	Residences within 100 ft of Centerline (number)	Residences within 101 to 300 ft of Centerline (number)	Residences within 301 to 500 ft of Centerline (number)	Residential Proximity Score (score)	Landowners within ROW (number)	Length Not Along Parcel Boundary (number)	Industrial Facilities within 100 ft of centerline (number)	Protected lands within 500 ft of centerline (number)	Grassland /Pasture within ROW (acres)	Croplands within ROW (acres)	Center-Pivot Irrigation within 100 ft of Centerline (number)
1	1,2,4,7,10,11,12,13	33.18	9	36	28.99	30.64	9	9.32	22727.32	27	4	21.64	187.76	0	0	7	10	31	115	25.12	1	0	148.19	228.88	1
2	1,2,4,6,10,11,12,13	32.52	11	37	28.27	29.98	9	9.06	32107.00	29	12	17.67	153.46	0	0	7	9	30	101	22.65	1	0	178.54	216.29	1
3	1,2,5,9,11,12,13	29.64	7	36	28.19	29.33	8	17.13	47304.37	32	6	41.44	198.12	0	0	14	17	59	102	21.68	1	1	168.14	140.91	0
4	1,2,5,8,12,13	29.88	6	34	29.81	23.31	8	20.54	53855.79	32	6	47.17	220.81	1	1	10	14	49	98	25.51	1	1	135.24	161.89	0
5	1,3,13	28.04	2	22	28.04	0.00	6	15.33	53267.34	30	7	36.16	265.14	6	1	6	6	29	97	26.18	1	0	66.40	162.71	0

*Categories with no data were removed. See Appendix C for the full route data table including categories with no measured data.

Table 3-4: Weighted Sorted Scores

	Weights	1	5	3	3	3	2	6	5	1	2	3	7	2	10	2	4	1	5	7	
Route	Segments	Total Length (miles)	Heavy Angles (> 40 degrees) (number)	Road Crossings (number)	Length Not Along Roads (miles)	Length Not Parallel Existing T-Line (miles)	T-Line Crossings (number)	Wetlands within ROW (acres)	Length through Bat Zone 2 (feet)	River/ Stream/ Waterways Crossed (number)	Waterbodies within the ROW (number)	Floodplain in ROW (acres)	Woodlands within ROW (acres)	Archaeological Sites within ROW (number)	Residential Proximity Score (score)	Length Not Along Parcel Boundary (number)	Protected lands within 500 ft of centerline (number)	Grassland /Pasture within ROW (acres)	Croplands within ROW (acres)	Center-Pivot Irrigation within 100 ft of Centerline (number)	Weighted Score
5	1,3,13	1.0	5.0	3	3.0	3.0	2.0	19.1	24.6	3.4	5	10.5	35.0	10.0	10.0	10.0	4	1.0	10.0	7	166.6
2	1,2,4,6,10,11,12,13	4.5	25.0	15	4.6	14.7	10.0	6.0	11.0	2.6	10	3.0	7.0	2.0	11.3	3.7	4	5.0	22.1	35	196.6
1	1,2,4,7,10,11,12,13	5.0	20.6	14.2	9.4	15.0	10.0	6.5	5.0	1	2	4.6	15.6	2.0	12.7	8.1	4	3.9	25.0	35	199.6
3	1,2,5,9,11,12,13	2.2	16.1	14.2	4.0	14.5	7.3	22.9	20.8	5	4	12.7	18.2	2.0	50.0	2.0	20	4.6	5.0	7	232.5
4	1,2,5,8,12,13	2.4	13.9	12.6	15.0	12.1	7.3	30.0	25.0	5	4	15.0	23.9	3.3	36.7	8.8	20	3.5	9.8	7	255.3

*Categories with no data were removed. See Appendix C for the full route data table including categories with no measured data.

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4.0 Selection of the Proposed Route

4.1 Selection of the Proposed Route

Route 3 and Route 4 scored higher (more impacting) than the other routes with a total weighted score of 232.5 and 255.3 respectively. These two routes share all but two segments. Route 4 (Segments 1, 2, 5, 8, 12, 13) had the greatest impact in 4 categories including floodplain in ROW, length through bat zone 2, wetlands within ROW, and length not along roads. Route 3 (segments 1, 2, 5, 9, 11, 12, 13) had the highest impact on 2 categories including road crossings, and residential proximity score. Routes 3 and 4 tie for the highest impact on protected lands within 500 feet and river crossings. In addition to Routes 3 and 4 scoring high for overall impacts, they both had high residential impact scores. For the reasons listed above Routes 3 and 4 were not further considered for the Proposed Route.

Route 1 and Route 2 are comparable in overall score and share all but one segment. These routes had a total weighted score of 199.6 and 196.6 respectively. Route 1 (segments 1, 2, 4, 7, 10, 11, 12, 13) had the highest impacts in 3 categories including total length, length not parallel to existing t-lines, and croplands in ROW. Route 2 (segments 1, 2, 4, 6, 10, 11, 12, 13) had the highest impact for 4 categories including grassland/pasture within ROW, waterbodies within ROW, road crossings, and heavy angles. Route 1 and Route 2 tie for impacts to center-pivot irrigation within 100 feet of centerline and transmission line crossings. Route 2 scored lower than Route 1 in 9 categories. Overall, these two routes a comparable but Route 1 was removed from further consideration due to higher residential impacts, longer total length, higher impacts to woodlands, higher impacts to floodplains, and higher impacts to croplands.

The two lowest-scoring routes for the Proposed 345 kV transmission line between the Montgomery Substation to the Burns Substation are Route 5 and Route 2. Common segments between these routes are segments 1 and 13, which are the segments entering each substation. These routes provide two geographically distinct route alternatives. Route 2 is further north than Route 5, traveling northwest out of the Montgomery Substation staying north of Whetstone Creek Conservation and Auxvasse before heading generally south to the Burns Substation. Route 5 is located south of Whetstone Creek Conservation Area and parallels the existing McCreadie to Montgomery 345 kV Transmission line. Route 5 generally travels northwest to the Burns Substation. Both Route 2 and Route 5 had low residential proximity scores and low protected lands scores. Route 2 was the least impacting across four factors (wetlands, floodplain, woodlands, and archaeological sites). Route 5 was the least impacting across 10 factors such as total length, heavy angles, residential proximity, and protected lands (see Table 3-4 for weighted factor scores). A significant difference between the two routes is total length, with Route 2 measuring at 32.52 miles and Route 5 measuring at 28.04. Route 2 adds significant length and heavy angles which have cost implications and generally increased scores in other routing factors. Route 2 had a slightly higher residential impact score of 11.3 (weighted) whereas Route 5 had a score of 10 (weighted), which is the lowest score of any route considered. Route 5 was ultimately selected as the Proposed Route because it minimized impacts across multiple routing factors including minimized residential impacts, requiring few heavy angles, minimized impacts to CPIs, and maximized paralleling an existing transmission corridor.

4.2 Description of the Proposed Route

Route 5 was identified as the Proposed Route for the Project (Figure 4-1). Route 5 is composed of segments 1, 3, and 13. Route 5 parallels the existing McCreadie to Montgomery 345 kV transmission line. Paralleling

existing infrastructure can minimize impacts including visual impacts, limit land fragmentation, and in this case, provide a more direct route from the Burns Substation to the Montgomery Substation. Route 5 exits the Montgomery Substation and parallels the south side of the existing McCreadie to Montgomery 345-kV transmission line for its entire length into the Burns Substation.

Route 5 had the lowest score in 13 of the 30 routing factors (lower in approximately 43% of the routing factors). Route 5 was the best overall scoring route for the proposed 345 kV transmission line which best addressed the purpose and need for the line while also minimizing the overall Project impacts. A detailed map showing the Proposed Route (Route 5) is shown below in Figure 4-1. The route data and sorted weighted minimum-maximum score associated with the Proposed Route, along with all other alternatives evaluated, are found in Tables 3-3 and 3-4 as well as Appendix C.

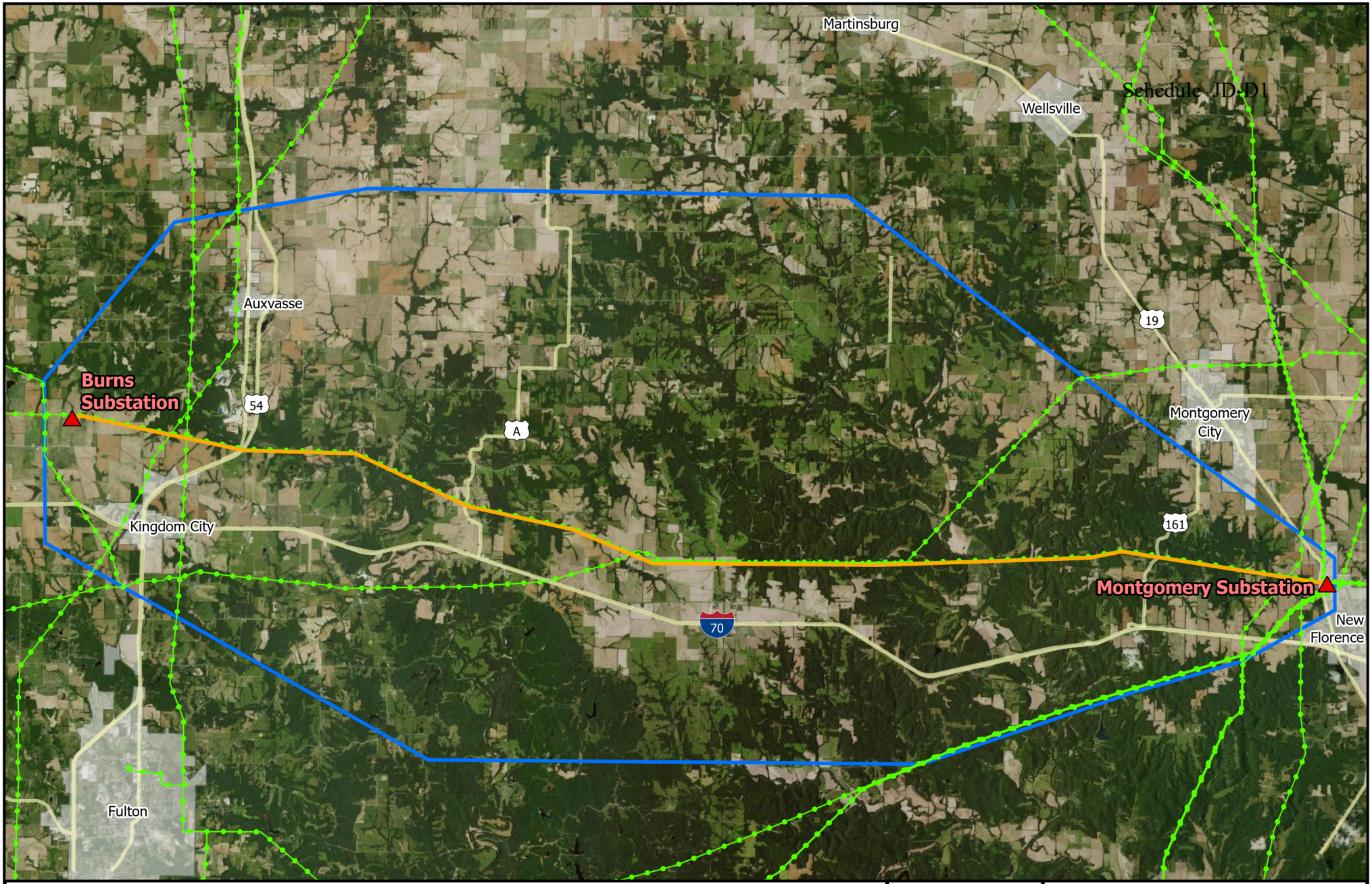


Figure 4-1
Ameren Missouri
Montgomery - Callaway
Connector Project
Proposed Route

Source: ESRI, NAIP, Tiger/Line, US Census, Ameren Missouri, Burns & McDonnell

Issued: 4/10/2025

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5.0 Agency/Public Outreach and Public Involvement

5.1 Agency Involvement

Ameren Missouri has held three separate meeting series for the project. The first set of meetings took place on August 6th and 7th, 2024 and were held virtually with federal and state agencies that could have an interest in the project. The second set of meetings was held January 21st, 2025, with local leaders and elected officials in Montgomery and Callaway Counties. These meetings were in-person meetings, held at the Legends Rec Plex in Fulton, Missouri and the Montgomery City Lion's Club in Montgomery County. Montgomery County had a second virtual meeting to meet with local leaders who were unable to attend the in-person meeting on February 3rd, 2025. Individuals were invited by notification letters as well as emails. A total of 8 people attended the Callaway County meeting. No local leaders were able to attend the Montgomery County in-person meeting on January 25th. A total of 8 people attended the Montgomery County virtual meeting on February 3rd, 2025.

5.2 Public Involvement

On February 4th and 5th, 2025, Ameren Missouri held a series of in-person Open Houses. The first series of Open Houses occurred at the Legends Rec Plex in Fulton, Missouri on February 4th. Approximately 40 people attended the morning session, while approximately 32 people attended the afternoon session. The second series of Open Houses occurred at the Montgomery City Lions Club in Montgomery City, Missouri on February 5th. Approximately 47 people attended the morning session, while approximately 27 people attended the afternoon session. Additional people attended the event but did not sign in or one person signed in for a party of multiple people. The above numbers include approximations of those that signed in and those attending that did not sign-in.

For the Open Houses the Project team received public comments through verbal communication, Geographical Information Systems (GIS) stations, online questionnaires, hard copy maps and physical questionnaires.

Project specialists answered questions from both the public and key stakeholders. Comments were recorded and were considered in Project planning and route selection processes.

Schedule JD-D1

6.0 Permitting Plan

6.1 Required Permits

The Federal and State Permits or approvals that have been identified as potentially being required for the construction and operation of the Project are shown in Table 6-1.

Agency	Type of Approval	When Required	Need
USFWS	Section 7 Threatened and Endangered Species Consultation and Clearance	Prior to construction	If the Project will potentially impact protected species or their respective habitat, or if a Section 404 and/or NPDES permit is required, then the FWS must be consulted. The FWS will determine the level of effort needed for the Project to proceed (e.g., desktop evaluation, habitat assessment, species surveys, avian impact studies, etc.).
	Migratory Bird Treaty Act / Bald and Golden Eagle Protection Act Compliance	Prior to construction	Required when construction or operation of a proposed facility could impact migratory birds, their nests, and especially threatened or endangered species.
USACE	Clean Water Act - Section 404 Permit	Prior to construction	Required to dredge or place fill in waters of the U.S., including wetlands Nationwide Permit: Less than or equal to 0.5 acre of wetland impacts Individual Permit: More than 0.5 acre of wetland impacts A wetland delineation would be required to determine the extent of wetland and/or stream impacts associated with Project construction.

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	Missouri Bat Programmatic Informal consultation	Prior to Construction	The Missouri Bat Programmatic (MBP) informal consultation covers three bat species (Indiana bat, Northern long-eared bat, and gray bat) listed under the ESA within the state of Missouri.
FAA	Notice of Proposed Construction	Prior to construction	Required for the construction of structures 200 feet tall or within the distance to height ratio from the nearest point of a FAA airport runway. Also required for construction equipment reaching heights over 200 feet, or for equipment taller than an FAA-issued 7460-1 hazard determination.
Missouri Department of Natural Resources (MDNR) – Water Protection Program	Section 401 Water Quality Certification (WQC)	Prior to construction	Required prior to Section 404 approval to verify that Project activities will not violate the State water quality standards. If 401 Water Quality Conditions are met under a USACE Nationwide Permit, then 401 WQC is granted upon issuance of the Nationwide Permit related to wetland and waterbody impacts. Otherwise, an Individual 401 Water Quality Certification is required from MDNR.
	NPDES Stormwater Permit and SWPPP Plan for Construction Activities and associated Notice of Intent (NOI)	Prior to construction	A general stormwater permit is required for construction activities that disturb 1 or more acres of land. A stormwater pollution prevention plan (SWPPP) is also required per the permit.

Schedule JD-D1

MDNR – SHPO	National Historic Preservation Act – Section 106 Clearance	Prior to construction	Under Section 106 of the National Historic Preservation Act, Federal agencies must work with the State Historic Preservation Office to address historic preservation issues when planning projects or issuing funds or permits that may affect historic properties and archaeological resources listed in or determined eligible for the National Register of Historic Places.

Schedule JD-D1

7.0 References

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USCB. (2022). DP04 Selected Housing Characteristics. Retrieved October 2024, from 2022 American Community Survey 5-Year: https://data.census.gov/table/ACSDP1Y2023.DP04?q=DP04

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Appendix A - IPaC

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Callaway and Montgomery counties, Missouri



Local office

Missouri Ecological Services Field Office

(573) 234-2132
(573) 234-2181

101 Park Deville Drive

Suite A
Columbia, MO 65203-0057

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

NOT FOR CONSULTATION

The following species are potentially affected by activities in this location:

Schedule JD-D1

Mammals

NAME	STATUS
Gray Bat Myotis grisescens Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat Myotis sodalis Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Western Regal Fritillary Argynnis idalia occidentalis Wherever found No critical habitat has been designated for this species.	Proposed Threatened

NOT FOR CONSULTATION

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are Bald Eagles and/or Golden Eagles in your project area.

Measures for Proactively Minimizing Eagle Impacts
For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the National Bald Eagle Management Guidelines. You may employ the timing and activity-specific distance recommendations in this document when designing your project/activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to Bald Eagle Nesting and Sensitivity to Human Activity.

NOT FOR CONSULTATION

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

If disturbance or take of eagles cannot be avoided, an incidental take permit may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the Do I Need A Permit Tool. For assistance making this determination for golden eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

Ensure Your Eagle List is Accurate and Complete
If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

Review the FAQs
The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Aug 31

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see

below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

Schedule JD-D1

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

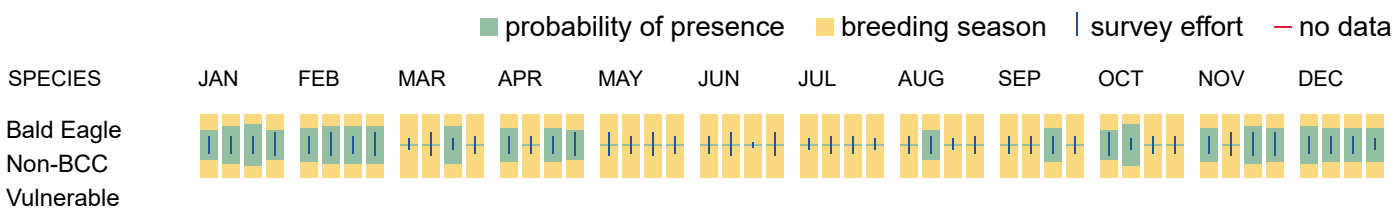
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



NOT FOR CONSULTATION

Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are an eagle (Bald and Golden Eagle Protection Act requirements may apply).

Proper interpretation and use of your eagle report
On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort line or no data line (red horizontal) means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your “IPaC PROBABILITY OF PRESENCE SUMMARY” at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

NOT FOR CONSULTATION

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area. Schedule JD-D1

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Migratory birds

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service). The incidental take of migratory birds is the injury or death of birds that results from, but is not the purpose, of an activity. The Service interprets the MBTA to prohibit incidental take.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Measures for Proactively Minimizing Migratory Bird Impacts

Your IPaC Migratory Bird list showcases birds of concern, including Birds of Conservation Concern (BCC), in your project location. This is not a comprehensive list of all birds found in your project area. However, you can help proactively minimize significant impacts to all birds at your project location by implementing the measures in the Nationwide avoidance and minimization measures for birds document, and any other project-specific avoidance and minimization measures suggested at the link Measures for avoiding and minimizing impacts to birds for the birds of concern on your list below.

NOT FOR CONSULTATION

Ensure Your Migratory Bird List is Accurate and Complete

If your project area is in a poorly surveyed area, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles document, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

Review the FAQs

The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Aug 31
Black-billed Cuckoo Coccyzus erythropthalmus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Cerulean Warbler Setophaga cerulea This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 21 to Jul 20
Chimney Swift Chaetura pelagica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will Antrostomus vociferus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20

NOT FOR CONSULTATION

Field Sparrow Spizella pusilla — Breeds Mar 1 to Aug 15

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Schedule JD-D1

Grasshopper Sparrow Ammodramus savannarum perpallidus — Breeds Jun 1 to Aug 20

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

https://ecos.fws.gov/ecp/species/8329

Henslow's Sparrow Centronyx henslowii — Breeds May 1 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

https://ecos.fws.gov/ecp/species/3941

Kentucky Warbler Geothlypis formosa — Breeds Apr 20 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Le Conte's Sparrow Ammospiza leconteii — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

https://ecos.fws.gov/ecp/species/9679

Prairie Warbler Setophaga discolor — Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prothonotary Warbler Protonotaria citrea — Breeds Apr 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

NOT FOR CONSULTATION

Upland Sandpiper Bartramia longicauda — Breeds May 1 to Aug 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9294

Schedule JD-D1

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

NOT FOR CONSULTATION

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

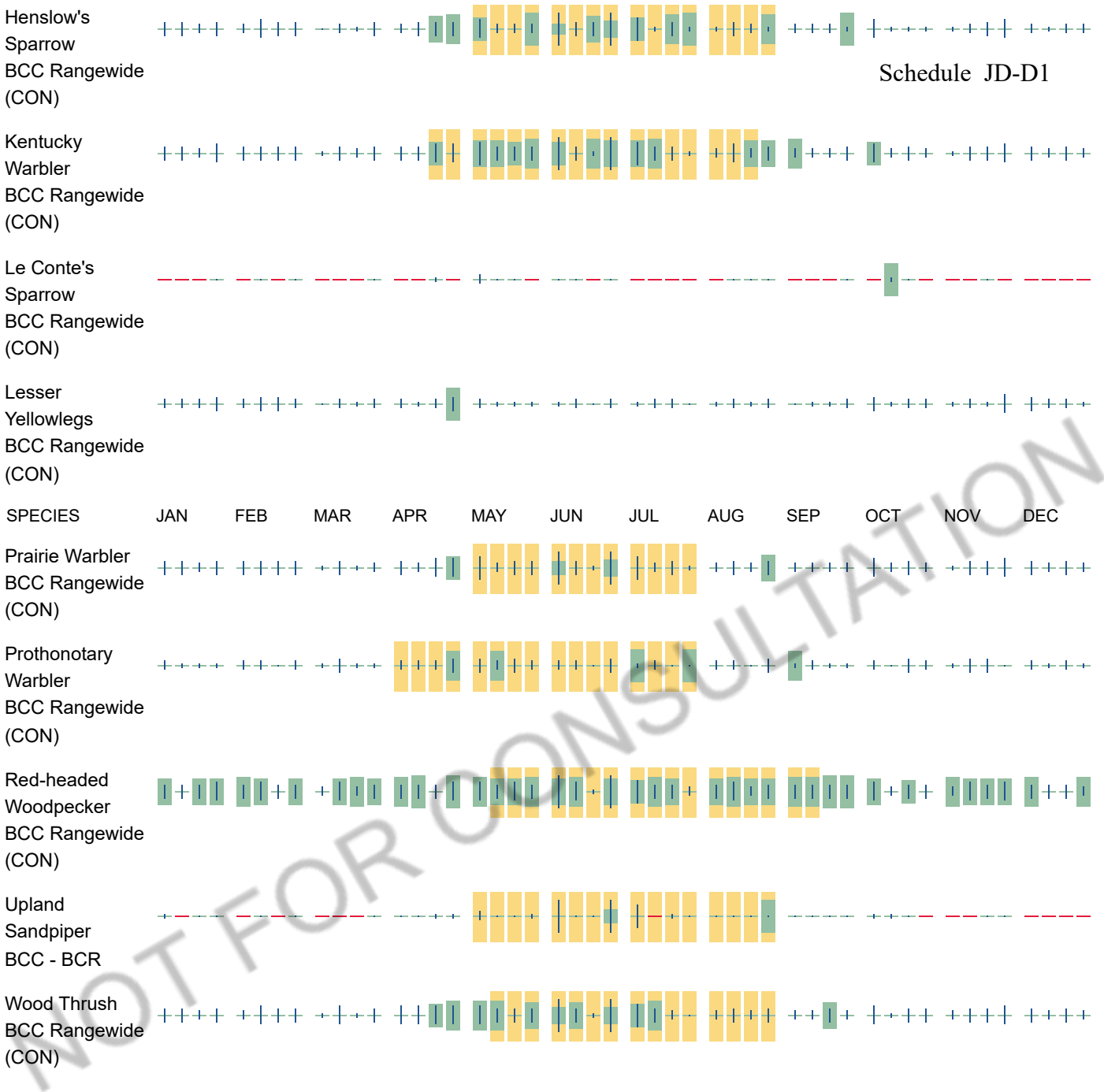
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



NOT FOR CONSULTATION



NOT FOR CONSULTATION

Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Avoidance & Minimization Measures for Birds describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see when birds are most likely to occur and breed in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

Schedule JD-D1

The Migratory Bird Resource List is comprised of Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the Bald and Golden Eagle Protection Act and those species marked as “Vulnerable”. See the FAQ “What are the levels of concern for migratory birds?” for more information on the levels of concern covered in the IPaC migratory bird species list.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle (Bald and Golden Eagle Protection Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, and to verify survey effort when no results present, please visit the Rapid Avian Information Locator (RAIL) Tool.

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your “IPaC PROBABILITY OF PRESENCE SUMMARY” at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

NOT FOR CONSULTATION

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Bald and Golden Eagle Protection Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Schedule JD-DT

Although it is important to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ “Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds”.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Proper interpretation and use of your migratory bird report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list does not represent all birds present in your project area. It is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:

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The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence for the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Schedule JD-DI

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

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Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in

activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Appendix B - Z Score Analysis Data Tables

Appendix B
Z-Score Analysis
Route Data with Z-Score
Montgomery - Callaway Connector Project

Schedule JD-D1

Route	Segments	Total Length	Heavy Angles Greater Than 30 Degrees	Forested Land in ROW	Wetlands in ROW	Residences Within 500ft	Total
Route_0641	1, 3, 7, 14, 23, 30, 41, 47, 55, 66, 77, 81, 83, 84, 85	-1.31577	-1.15859	-2.56835	-1.571976	-0.4449087	-7.0596
		158898.7	9	153.9721	10.55002	16	
Route_0601	1, 3, 7, 14, 22, 40, 54, 65, 81, 83, 84, 85	-0.86633	-1.39416	-2.21753	-1.877717	-0.4449087	-6.80064
		164386.3	8	166.1903	9.5640145	16	
Route_0637	1, 3, 7, 14, 23, 30, 41, 47, 55, 61, 65, 81, 83, 84, 85	-0.41406	-0.92302	-2.99857	-1.798832	-0.6165401	-6.75102
		169908.4	10	138.989	9.8184166	15	
Route_0631	1, 3, 7, 14, 23, 30, 41, 46, 54, 65, 81, 83, 84, 85	-0.42152	-0.92302	-2.54121	-1.961848	-0.7881716	-6.63577
		169817.2	10	154.9174	9.2926966	14	
Route_0681	1, 3, 7, 15, 24, 30, 41, 47, 55, 66, 77, 81, 83, 84, 85	-1.30837	-1.15859	-2.17803	-1.278853	-0.6165401	-6.54038
		158989.1	9	167.5659	11.49533	15	
Route_0616	1, 3, 7, 14, 23, 30, 34, 40, 54, 65, 81, 83, 84, 85	-0.32063	-0.92302	-2.6438	-2.121158	-0.4449087	-6.45352
		171049.1	10	151.3445	8.7789267	16	
Route_0677	1, 3, 7, 15, 24, 30, 41, 47, 55, 61, 65, 81, 83, 84, 85	-0.40665	-0.92302	-2.60824	-1.505709	-0.7881716	-6.2318
		169998.8	10	152.5828	10.763727	14	
Route_0671	1, 3, 7, 15, 24, 30, 41, 46, 54, 65, 81, 83, 84, 85	-0.41412	-0.92302	-2.15089	-1.668725	-0.959803	-6.11655
		169907.6	10	168.5112	10.238007	13	
Route_0656	1, 3, 7, 15, 24, 30, 34, 40, 54, 65, 81, 83, 84, 85	-0.31323	-0.92302	-2.25348	-1.828035	-0.6165401	-5.93429
		171139.5	10	164.9383	9.7242374	15	
Route_0104	1, 2, 5, 9, 17, 32, 43, 52, 58, 63, 68, 75, 82, 85	-2.07485	-2.10088	0.091128	-0.449348	-0.7881716	-5.32213
		149630.5	5	246.5936	14.17045	14	
Route_0102	1, 2, 5, 9, 17, 32, 43, 52, 57, 68, 75, 82, 85	-2.08858	-2.10088	-0.01389	-0.480457	-0.6165401	-5.30036
		149462.9	5	242.9361	14.070128	15	
Route_0103	1, 2, 5, 9, 17, 32, 43, 52, 58, 63, 68, 74, 85	-2.18837	-2.8076	0.728689	-0.058453	-0.959803	-5.28554
		148244.5	2	268.7979	15.431073	13	
Route_0101	1, 2, 5, 9, 17, 32, 43, 52, 57, 68, 74, 85	-2.2021	-2.8076	0.623669	-0.089561	-0.7881716	-5.26376
		148076.9	2	265.1403	15.33075	14	
Route_0634	1, 3, 7, 14, 23, 30, 41, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	-0.68384	-0.68744	-2.15557	-1.118872	-0.6165401	-5.26226
		166614.4	11	168.3481	12.011262	15	
Route_0052	1, 2, 4, 13, 21, 29, 39, 50, 53, 59, 63, 68, 75, 82, 85	-0.94757	-1.15859	-0.19013	-1.457344	-1.4746973	-5.22834
		163394.3	9	236.7981	10.919703	10	
Route_0051	1, 2, 4, 13, 21, 29, 39, 50, 53, 59, 63, 68, 74, 85	-1.06108	-1.86531	0.447427	-1.066449	-1.6463288	-5.19174
		162008.4	6	259.0024	12.180325	9	
Route_0309	1, 2, 5, 10, 12, 19, 33, 44, 48, 52, 58, 63, 68, 75, 82, 85	-1.95327	-1.62974	-0.47111	-0.766093	-0.2732772	-5.09349
		151115	7	227.0125	13.14896	17	
Route_0632	1, 3, 7, 14, 23, 30, 41, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	0.601124	-0.45187	-2.72239	-1.721154	-0.7881716	-5.08247
		182303.5	12	148.6073	10.068926	14	
Route_0307	1, 2, 5, 10, 12, 19, 33, 44, 48, 52, 57, 68, 75, 82, 85	-1.967	-1.62974	-0.57613	-0.797201	-0.1016458	-5.07171
		150947.4	7	223.355	13.048638	18	
Route_0308	1, 2, 5, 10, 12, 19, 33, 44, 48, 52, 58, 63, 68, 74, 85	-2.06678	-2.33646	0.16645	-0.375198	-0.4449087	-5.0569
		149729	4	249.2168	14.409582	16	
Route_0306	1, 2, 5, 10, 12, 19, 33, 44, 48, 52, 57, 68, 74, 85	-2.08051	-2.33646	0.06143	-0.406306	-0.2732772	-5.03512
		149561.4	4	245.5593	14.30926	17	
Route_0149	1, 2, 5, 9, 18, 19, 33, 44, 48, 52, 58, 63, 68, 75, 82, 85	-1.82387	-1.62974	-0.29261	-0.77362	-0.4449087	-4.96475
		152694.9	7	233.2291	13.124688	16	
Route_0147	1, 2, 5, 9, 18, 19, 33, 44, 48, 52, 57, 68, 75, 82, 85	-1.8376	-1.62974	-0.39763	-0.804728	-0.2732772	-4.94298
		152527.3	7	229.5716	13.024366	17	
Route_0148	1, 2, 5, 9, 18, 19, 33, 44, 48, 52, 58, 63, 68, 74, 85	-1.93739	-2.33646	0.344949	-0.382724	-0.6165401	-4.92816
		151308.9	4	255.4334	14.38531	15	
Route_0633	1, 3, 7, 14, 23, 30, 41, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	-0.30059	-0.2163	-2.29217	-1.494291	-0.6165401	-4.91988
		171293.8	13	163.5909	10.800548	15	
Route_0146	1, 2, 5, 9, 18, 19, 33, 44, 48, 52, 57, 68, 74, 85	-1.95111	-2.33646	0.239929	-0.413833	-0.4449087	-4.90638
		151141.3	4	251.7759	14.284988	16	
Route_0638	1, 3, 7, 14, 23, 30, 41, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.77799	-0.68744	-2.13811	-1.095859	-0.1016458	-4.80104
		165464.9	11	168.9563	12.085477	18	
Route_0674	1, 3, 7, 15, 24, 30, 41, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	-0.67644	-0.68744	-1.76524	-0.825749	-0.7881716	-4.74304
		166704.8	11	181.9419	12.956573	14	
Route_0074	1, 2, 5, 9, 17, 27, 33, 44, 48, 52, 58, 63, 68, 75, 82, 85	-1.84847	-1.62974	-0.77025	-0.178005	-0.2732772	-4.69974
		152394.6	7	216.5945	15.045523	17	
Route_0072	1, 2, 5, 9, 17, 27, 33, 44, 48, 52, 57, 68, 75, 82, 85	-1.8622	-1.62974	-0.87527	-0.209113	-0.1016458	-4.67796
		152227	7	212.937	14.945201	18	
Route_0073	1, 2, 5, 9, 17, 27, 33, 44, 48, 52, 58, 63, 68, 74, 85	-1.96198	-2.33646	-0.13269	0.2128903	-0.4449087	-4.66315
		151008.6	4	238.7988	16.306146	16	
Route_0071	1, 2, 5, 9, 17, 27, 33, 44, 48, 52, 57, 68, 74, 85	-1.97571	-2.33646	-0.23771	0.1817822	-0.2732772	-4.64137
		150841	4	235.1412	16.205823	17	
Route_0044	1, 2, 4, 13, 21, 28, 33, 44, 48, 52, 58, 63, 68, 75, 82, 85	-1.18034	-1.62974	-0.63266	-0.569371	-0.6165401	-4.62865
		160552.3	7	221.3862	13.783382	15	

Appendix B
Z-Score Analysis
Route Data with Z-Score
Montgomery - Callaway Connector Project

Schedule JD-D1

Route_0042	1, 2, 4, 13, 21, 28, 33, 44, 48, 52, 57, 68, 75, 82, 85	-1.19407	-1.62974	-0.73768	-0.600479	-0.4449087	-4.60687
		160384.7	7	217.7287	13.68306	16	
Route_0314	1, 2, 5, 10, 12, 19, 33, 44, 49, 59, 63, 68, 75, 82, 85	-1.76761	-1.39416	-0.47113	-0.515943	-0.4449087	-4.59376
		153381.8	8	227.012	13.955685	16	
Route_0043	1, 2, 4, 13, 21, 28, 33, 44, 48, 52, 58, 63, 68, 74, 85	-1.29385	-2.33646	0.004898	-0.178476	-0.7881716	-4.59206
		159166.3	4	243.5905	15.044004	14	
Route_0041	1, 2, 4, 13, 21, 28, 33, 44, 48, 52, 57, 68, 74, 85	-1.30758	-2.33646	-0.10012	-0.209584	-0.6165401	-4.57028
		158998.7	4	239.9329	14.943682	15	
Route_0672	1, 3, 7, 15, 24, 30, 41, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	0.608529	-0.45187	-2.33207	-1.428031	-0.959803	-4.56324
		182393.9	12	162.2011	11.014236	13	
Route_0313	1, 2, 5, 10, 12, 19, 33, 44, 49, 59, 63, 68, 74, 85	-1.88113	-2.10088	0.166433	-0.125048	-0.6165401	-4.55716
		151995.9	5	249.2162	15.216308	15	
Route_0600	1, 3, 7, 14, 22, 40, 54, 61, 66, 77, 81, 83, 84, 85	-0.25334	-0.68744	-1.7873	-1.542611	-0.2732772	-4.54397
		171870.7	11	181.1736	10.644718	17	
Route_0154	1, 2, 5, 9, 18, 19, 33, 44, 49, 59, 63, 68, 75, 82, 85	-1.63822	-1.39416	-0.29263	-0.523469	-0.6165401	-4.46502
		154961.7	8	233.2286	13.931413	15	
Route_0153	1, 2, 5, 9, 18, 19, 33, 44, 49, 59, 63, 68, 74, 85	-1.75173	-2.10088	0.344933	-0.132574	-0.7881716	-4.42843
		153575.8	5	255.4328	15.192035	14	
Route_0624	1, 3, 7, 14, 23, 30, 35, 42, 56, 67, 71, 77, 81, 83, 84, 85	-0.69132	-0.68744	-2.15763	-1.298912	0.41324851	-4.42207
		166523	11	168.2762	11.430641	21	
Route_0673	1, 3, 7, 15, 24, 30, 41, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	-0.29319	-0.2163	-1.90184	-1.201168	-0.7881716	-4.40066
		171384.2	13	177.1847	11.745859	14	
Route_0094	1, 2, 5, 9, 17, 32, 36, 44, 48, 52, 58, 63, 68, 75, 82, 85	-1.86705	-1.62974	-0.16639	-0.272697	-0.4449087	-4.38078
		152167.8	7	237.625	14.740144	16	
Route_0630	1, 3, 7, 14, 23, 30, 41, 46, 54, 61, 66, 77, 81, 83, 84, 85	0.191469	-0.2163	-2.11099	-1.626742	-0.6165401	-4.3791
		177301.7	13	169.9007	10.3734	15	
Route_0092	1, 2, 5, 9, 17, 32, 36, 44, 48, 52, 57, 68, 75, 82, 85	-1.88077	-1.62974	-0.27141	-0.303805	-0.2732772	-4.359
		152000.2	7	233.9675	14.639822	17	
Route_0093	1, 2, 5, 9, 17, 32, 36, 44, 48, 52, 58, 63, 68, 74, 85	-1.98056	-2.33646	0.47117	0.1181979	-0.6165401	-4.34419
		150781.8	4	259.8293	16.000766	15	
Route_0091	1, 2, 5, 9, 17, 32, 36, 44, 48, 52, 57, 68, 74, 85	-1.99429	-2.33646	0.366149	0.0870898	-0.4449087	-4.32241
		150614.2	4	256.1717	15.900444	16	
Route_0678	1, 3, 7, 15, 24, 30, 41, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.77058	-0.68744	-1.74778	-0.802736	-0.2732772	-4.28182
		165555.3	11	182.55	13.030787	17	
Route_0262	1, 2, 5, 10, 11, 13, 21, 29, 39, 50, 53, 59, 63, 68, 75, 82, 85	-0.78059	-0.45187	0.004464	-1.562153	-1.4746973	-4.26485
		165433.1	12	243.5754	10.581696	10	
Route_0294	1, 2, 5, 10, 12, 19, 33, 36, 43, 52, 58, 63, 68, 75, 82, 85	-1.78012	-1.15859	0.233682	-0.942606	-0.6165401	-4.26417
		153229.1	9	251.5583	12.579714	15	
Route_0292	1, 2, 5, 10, 12, 19, 33, 36, 43, 52, 57, 68, 75, 82, 85	-1.79385	-1.15859	0.128662	-0.973714	-0.4449087	-4.2424
		153061.5	9	247.9008	12.479391	16	
Route_0622	1, 3, 7, 14, 23, 30, 35, 42, 56, 62, 61, 65, 81, 83, 84, 85	0.59364	-0.45187	-2.72446	-1.901193	0.24161707	-4.24227
		182212.1	12	148.5354	9.4883044	20	
Route_0261	1, 2, 5, 10, 11, 13, 21, 29, 39, 50, 53, 59, 63, 68, 74, 85	-0.8941	-1.15859	0.642025	-1.171258	-1.6463288	-4.22826
		164047.1	9	265.7796	11.842318	9	
Route_0293	1, 2, 5, 10, 12, 19, 33, 36, 43, 52, 58, 63, 68, 74, 85	-1.89363	-1.86531	0.871243	-0.551711	-0.7881716	-4.22758
		151843.2	6	273.7626	13.840336	14	
Route_0291	1, 2, 5, 10, 12, 19, 33, 36, 43, 52, 57, 68, 74, 85	-1.90736	-1.86531	0.766223	-0.582819	-0.6165401	-4.20581
		151675.5	6	270.1051	13.740013	15	
Route_0079	1, 2, 5, 9, 17, 27, 33, 44, 49, 59, 63, 68, 75, 82, 85	-1.66281	-1.39416	-0.77027	0.0721454	-0.4449087	-4.20001
		154661.4	8	216.5939	15.852248	16	
Route_0615	1, 3, 7, 14, 23, 30, 34, 40, 54, 61, 66, 77, 81, 83, 84, 85	0.29236	-0.2163	-2.21358	-1.786052	-0.2732772	-4.19684
		178533.5	13	166.3279	9.8596302	17	
Route_0078	1, 2, 5, 9, 17, 27, 33, 44, 49, 59, 63, 68, 74, 85	-1.77633	-2.10088	-0.1327	0.4630405	-0.6165401	-4.16341
		153275.4	5	238.7982	17.112871	15	
Route_0134	1, 2, 5, 9, 18, 19, 33, 36, 43, 52, 58, 63, 68, 75, 82, 85	-1.65072	-1.15859	0.412182	-0.950132	-0.7881716	-4.13543
		154809	9	257.7749	12.555441	14	
Route_0049	1, 2, 4, 13, 21, 28, 33, 44, 49, 59, 63, 68, 75, 82, 85	-0.99468	-1.39416	-0.63268	-0.319221	-0.7881716	-4.12892
		162819.1	8	221.3856	14.590107	14	
Route_0132	1, 2, 5, 9, 18, 19, 33, 36, 43, 52, 57, 68, 75, 82, 85	-1.66445	-1.15859	0.307162	-0.98124	-0.6165401	-4.11366
		154641.4	9	254.1174	12.455119	15	
Route_0133	1, 2, 5, 9, 18, 19, 33, 36, 43, 52, 58, 63, 68, 74, 85	-1.76424	-1.86531	1.049743	-0.559237	-0.959803	-4.09884
		153423.1	6	279.9792	13.816064	13	
Route_0048	1, 2, 4, 13, 21, 28, 33, 44, 49, 59, 63, 68, 74, 85	-1.10819	-2.10088	0.004882	0.0716743	-0.959803	-4.09232
		161433.2	5	243.5899	15.850729	13	
Route_0623	1, 3, 7, 14, 23, 30, 35, 42, 56, 62, 66, 77, 81, 83, 84, 85	-0.30807	-0.2163	-2.29423	-1.674331	0.41324851	-4.07968
		171202.4	13	163.5189	10.219927	21	
Route_0131	1, 2, 5, 9, 18, 19, 33, 36, 43, 52, 57, 68, 74, 85	-1.77796	-1.86531	0.944723	-0.590345	-0.7881716	-4.07707
		153255.4	6	276.3217	13.715741	14	
Route_0105	1, 2, 5, 9, 17, 32, 43, 52, 58, 64, 76, 80, 82, 85	-1.76706	-1.15859	-0.85604	0.168863	-0.4449087	-4.05774
		153388.6	9	213.6067	16.164159	16	
Route_0635	1, 3, 7, 14, 23, 30, 41, 47, 51, 56, 67, 72, 73, 79, 84, 85	-0.73613	-1.15859	-1.49282	-0.72689	0.06998564	-4.04444
		165976	9	191.4297	13.275388	19	

Appendix B
Z-Score Analysis
Route Data with Z-Score
Montgomery - Callaway Connector Project

Schedule JD-D1

Route_0636	1, 3, 7, 14, 23, 30, 41, 47, 51, 56, 67, 72, 78, 83, 84, 85	-0.75078	-0.45187	-2.0427	-1.850208	1.09977427	-3.99578
		165797.1	12	172.279	9.6527317	25	
Route_0024	1, 2, 4, 13, 21, 28, 27, 32, 43, 52, 58, 63, 68, 75, 82, 85	-1.01566	-1.62974	0.228721	-0.380561	-1.1314344	-3.92867
		162562.9	7	251.3855	14.392289	12	
Route_0289	1, 2, 5, 10, 12, 19, 27, 32, 43, 52, 58, 63, 68, 75, 82, 85	-1.7886	-1.15859	0.390273	-0.581619	-0.7881716	-3.9267
		153125.6	9	257.0119	13.743884	14	
Route_0022	1, 2, 4, 13, 21, 28, 27, 32, 43, 52, 57, 68, 75, 82, 85	-1.02939	-1.62974	0.123701	-0.411669	-0.959803	-3.9069
		162395.3	7	247.728	14.291966	13	
Route_0287	1, 2, 5, 10, 12, 19, 27, 32, 43, 52, 57, 68, 75, 82, 85	-1.80232	-1.15859	0.285253	-0.612727	-0.6165401	-3.90493
		152958	9	253.3544	13.643561	15	
Route_0664	1, 3, 7, 15, 24, 30, 35, 42, 56, 67, 71, 77, 81, 83, 84, 85	-0.68392	-0.68744	-1.76731	-1.005789	0.24161707	-3.90284
		166613.4	11	181.8699	12.375951	20	
Route_0023	1, 2, 4, 13, 21, 28, 27, 32, 43, 52, 58, 63, 68, 74, 85	-1.12917	-2.33646	0.866282	0.0103345	-1.3030659	-3.89208
		161177	4	273.5898	15.652911	11	
Route_0288	1, 2, 5, 10, 12, 19, 27, 32, 43, 52, 58, 63, 68, 74, 85	-1.90211	-1.86531	1.027834	-0.190724	-0.959803	-3.89011
		151739.7	6	279.2162	15.004506	13	
Route_0099	1, 2, 5, 9, 17, 32, 36, 44, 49, 59, 63, 68, 75, 82, 85	-1.68139	-1.39416	-0.16641	-0.022547	-0.6165401	-3.88105
		154434.6	8	237.6244	15.546869	15	
Route_0059	1, 2, 5, 9, 17, 27, 33, 36, 43, 52, 58, 63, 68, 75, 82, 85	-1.67532	-1.15859	-0.06546	-0.354517	-0.6165401	-3.87042
		154508.7	9	241.1403	14.476277	15	
Route_0021	1, 2, 4, 13, 21, 28, 27, 32, 43, 52, 57, 68, 74, 85	-1.1429	-2.33646	0.761262	-0.020774	-1.1314344	-3.87031
		161009.4	4	269.9323	15.552588	12	
Route_0286	1, 2, 5, 10, 12, 19, 27, 32, 43, 52, 57, 68, 74, 85	-1.91584	-1.86531	0.922814	-0.221832	-0.7881716	-3.86834
		151572	6	275.5586	14.904184	14	
Route_0670	1, 3, 7, 15, 24, 30, 41, 46, 54, 61, 66, 77, 81, 83, 84, 85	0.198874	-0.2163	-1.72066	-1.333619	-0.7881716	-3.85988
		177392.1	13	183.4945	11.318711	14	
Route_0057	1, 2, 5, 9, 17, 27, 33, 36, 43, 52, 57, 68, 75, 82, 85	-1.68905	-1.15859	-0.17048	-0.385626	-0.4449087	-3.84865
		154341.1	9	237.4827	14.375954	16	
Route_0098	1, 2, 5, 9, 17, 32, 36, 44, 49, 59, 63, 68, 74, 85	-1.7949	-2.10088	0.471153	0.3683481	-0.7881716	-3.84445
		153048.6	5	259.8287	16.807491	14	
Route_0058	1, 2, 5, 9, 17, 27, 33, 36, 43, 52, 58, 63, 68, 74, 85	-1.78883	-1.86531	0.572105	0.0363777	-0.7881716	-3.83383
		153122.7	6	263.3445	15.736899	14	
Route_0310	1, 2, 5, 10, 12, 19, 33, 44, 48, 52, 58, 64, 76, 80, 82, 85	-1.64548	-0.68744	-1.41828	-0.147882	0.06998564	-3.82909
		154873.1	11	194.0256	15.142669	19	
Route_0056	1, 2, 5, 9, 17, 27, 33, 36, 43, 52, 57, 68, 74, 85	-1.80256	-1.86531	0.467085	0.0052696	-0.6165401	-3.81206
		152955.1	6	259.687	15.636577	15	
Route_0029	1, 2, 4, 13, 21, 28, 33, 36, 43, 52, 58, 63, 68, 75, 82, 85	-1.00719	-1.15859	0.072131	-0.745884	-0.959803	-3.79933
		162666.4	9	245.932	13.214135	13	
Route_0129	1, 2, 5, 9, 18, 19, 27, 32, 43, 52, 58, 63, 68, 75, 82, 85	-1.6592	-1.15859	0.568773	-0.589145	-0.959803	-3.79796
		154705.5	9	263.2285	13.719612	13	
Route_0027	1, 2, 4, 13, 21, 28, 33, 36, 43, 52, 57, 68, 75, 82, 85	-1.02091	-1.15859	-0.03289	-0.776992	-0.7881716	-3.77756
		162498.8	9	242.2744	13.113813	14	
Route_0127	1, 2, 5, 9, 18, 19, 27, 32, 43, 52, 57, 68, 75, 82, 85	-1.67293	-1.15859	0.463753	-0.620253	-0.7881716	-3.77619
		154537.9	9	259.571	13.619289	14	
Route_0028	1, 2, 4, 13, 21, 28, 33, 36, 43, 52, 58, 63, 68, 74, 85	-1.1207	-1.86531	0.709691	-0.354988	-1.1314344	-3.76274
		161280.5	6	268.1362	14.474758	12	
Route_0128	1, 2, 5, 9, 18, 19, 27, 32, 43, 52, 58, 63, 68, 74, 85	-1.77271	-1.86531	1.206334	-0.19825	-1.1314344	-3.76137
		153319.6	6	285.4328	14.980234	12	
Route_0026	1, 2, 4, 13, 21, 28, 33, 36, 43, 52, 57, 68, 74, 85	-1.13443	-1.86531	0.604671	-0.386097	-0.959803	-3.74097
		161112.9	6	264.4787	14.374435	13	
Route_0126	1, 2, 5, 9, 18, 19, 27, 32, 43, 52, 57, 68, 74, 85	-1.78644	-1.86531	1.101314	-0.229358	-0.959803	-3.7396
		153151.9	6	281.7752	14.879911	13	
Route_0053	1, 2, 4, 13, 21, 29, 39, 50, 53, 59, 64, 76, 80, 82, 85	-0.63978	0.019277	-1.1372	-0.8391	-1.1314344	-3.72824
		167152.4	14	203.8146	12.913517	12	
Route_0662	1, 3, 7, 15, 24, 30, 35, 42, 56, 62, 61, 65, 81, 83, 84, 85	0.601045	-0.45187	-2.33414	-1.60807	0.06998564	-3.72305
		182302.5	12	162.1292	10.433615	19	
Route_0150	1, 2, 5, 9, 18, 19, 33, 44, 48, 52, 58, 64, 76, 80, 82, 85	-1.51608	-0.68744	-1.23978	-0.155408	-0.1016458	-3.70036
		156453	11	200.2422	15.118397	18	
Route_0655	1, 3, 7, 15, 24, 30, 34, 40, 54, 61, 66, 77, 81, 83, 84, 85	0.299765	-0.2163	-1.82325	-1.492929	-0.4449087	-3.67762
		178624	13	179.9217	10.804941	16	
Route_0254	1, 2, 5, 10, 11, 13, 21, 28, 33, 44, 48, 52, 58, 63, 68, 75, 82, 85	-1.01336	-0.92302	-0.43807	-0.674181	-0.6165401	-3.66516
		162591.1	10	228.1634	13.445375	15	
Route_0252	1, 2, 5, 10, 11, 13, 21, 28, 33, 44, 48, 52, 57, 68, 75, 82, 85	-1.02709	-0.92302	-0.54309	-0.705289	-0.4449087	-3.64339
		162423.4	10	224.5059	13.345053	16	
Route_0253	1, 2, 5, 10, 11, 13, 21, 28, 33, 44, 48, 52, 58, 63, 68, 74, 85	-1.12687	-1.62974	0.199496	-0.283285	-0.7881716	-3.62857
		161205.1	7	250.3677	14.705998	14	
Route_0251	1, 2, 5, 10, 11, 13, 21, 28, 33, 44, 48, 52, 57, 68, 74, 85	-1.1406	-1.62974	0.094475	-0.314393	-0.6165401	-3.60679
		161037.5	7	246.7102	14.605675	15	
Route_0639	1, 3, 7, 14, 23, 30, 41, 47, 55, 62, 67, 72, 73, 79, 84, 85	-0.83027	-1.15859	-1.47534	-0.703878	0.58487995	-3.5832
		164826.5	9	192.0382	13.349603	22	
Route_0663	1, 3, 7, 15, 24, 30, 35, 42, 56, 62, 66, 77, 81, 83, 84, 85	-0.30067	-0.2163	-1.90391	-1.381208	0.24161707	-3.56046
		171292.8	13	177.1127	11.165238	20	

Appendix B
Z-Score Analysis
Route Data with Z-Score
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Route_0425	1, 3, 6, 8, 14, 23, 30, 41, 47, 55, 66, 77, 81, 83, 84, 85	-1.01885	-0.68744	-1.25852	-0.815771	0.24161707	-3.53897
		162524	11	199.5896	12.988751	20	
Route_0640	1, 3, 7, 14, 23, 30, 41, 47, 55, 62, 67, 72, 78, 83, 84, 85	-0.84493	-0.45187	-2.02523	-1.827195	1.61466858	-3.53455
		164647.6	12	172.8875	9.7269466	28	
Route_0675	1, 3, 7, 15, 24, 30, 41, 47, 51, 56, 67, 72, 73, 79, 84, 85	-0.72872	-1.15859	-1.10249	-0.433767	-0.1016458	-3.52522
		166066.4	9	205.0235	14.220699	18	
Route_0676	1, 3, 7, 15, 24, 30, 41, 47, 51, 56, 67, 72, 78, 83, 84, 85	-0.74337	-0.45187	-1.65237	-1.557085	0.92814283	-3.47656
		165887.5	12	185.8728	10.598042	24	
Route_0075	1, 2, 5, 9, 17, 27, 33, 44, 48, 52, 58, 64, 76, 80, 82, 85	-1.54068	-0.68744	-1.71742	0.4402066	0.06998564	-3.43534
		156152.7	11	183.6076	17.039232	19	
Route_0545	1, 3, 6, 16, 25, 24, 30, 41, 47, 55, 66, 77, 81, 83, 84, 85	-1.07469	-0.45187	-0.65196	-0.762247	-0.4449087	-3.38568
		161842.2	12	220.7142	13.161363	16	
Route_0045	1, 2, 4, 13, 21, 28, 33, 44, 48, 52, 58, 64, 76, 80, 82, 85	-0.87254	-0.68744	-1.57983	0.0488404	-0.2732772	-3.36425
		164310.4	11	188.3993	15.777091	17	
Route_0385	1, 3, 6, 8, 14, 22, 40, 54, 65, 81, 83, 84, 85	-0.56941	-0.92302	-0.90769	-1.121513	0.24161707	-3.28001
		168011.6	10	211.8077	12.002745	20	
Route_0421	1, 3, 6, 8, 14, 23, 30, 41, 47, 55, 61, 65, 81, 83, 84, 85	-0.11714	-0.45187	-1.68873	-1.042628	0.06998564	-3.23038
		173533.7	12	184.6065	12.257147	19	
Route_0625	1, 3, 7, 14, 23, 30, 35, 42, 56, 67, 72, 73, 79, 84, 85	-0.74361	-1.15859	-1.49488	-0.90693	1.09977427	-3.20424
		165884.6	9	191.3578	12.694767	25	
Route_0259	1, 2, 5, 10, 11, 13, 21, 28, 33, 44, 49, 59, 63, 68, 75, 82, 85	-0.8277	-0.68744	-0.43808	-0.42403	-0.7881716	-3.16543
		164857.9	11	228.1629	14.2521	14	
Route_0626	1, 3, 7, 14, 23, 30, 35, 42, 56, 67, 72, 78, 83, 84, 85	-0.75826	-0.45187	-2.04477	-2.030247	2.1295629	-3.15558
		165705.7	12	172.2071	9.0721106	31	
Route_0302	1, 2, 5, 10, 12, 19, 33, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	-0.95832	-0.2163	-0.4541	-0.732293	-0.7881716	-3.14919
		163263	13	227.6049	13.257966	14	
Route_0258	1, 2, 5, 10, 11, 13, 21, 28, 33, 44, 49, 59, 63, 68, 74, 85	-0.94121	-1.39416	0.199479	-0.033135	-0.959803	-3.12884
		163471.9	8	250.3671	15.512723	13	
Route_0095	1, 2, 5, 9, 17, 32, 36, 44, 48, 52, 58, 64, 76, 80, 82, 85	-1.55925	-0.68744	-1.11356	0.3455142	-0.1016458	-3.11638
		155925.9	11	204.6381	16.733853	18	
Route_0415	1, 3, 6, 8, 14, 23, 30, 41, 46, 54, 65, 81, 83, 84, 85	-0.1246	-0.45187	-1.23138	-1.205643	-0.1016458	-3.11514
		173442.6	12	200.5349	11.731427	18	
Route_0301	1, 2, 5, 10, 12, 19, 33, 37, 45, 50, 53, 59, 63, 68, 74, 85	-1.07184	-0.92302	0.183458	-0.341397	-0.959803	-3.11259
		161877.1	10	249.8092	14.518588	13	
Route_0315	1, 2, 5, 10, 12, 19, 33, 44, 49, 59, 64, 76, 80, 82, 85	-1.45982	-0.2163	-1.4182	0.102301	-0.1016458	-3.09366
		157139.9	13	194.0284	15.949499	18	
Route_0541	1, 3, 6, 16, 25, 24, 30, 41, 47, 55, 61, 65, 81, 83, 84, 85	-0.17298	-0.2163	-1.08217	-0.989104	-0.6165401	-3.07709
		172851.9	13	205.7311	12.42976	15	
Route_0679	1, 3, 7, 15, 24, 30, 41, 47, 55, 62, 67, 72, 73, 79, 84, 85	-0.82287	-1.15859	-1.08502	-0.410755	0.41324851	-3.06398
		164916.9	9	205.632	14.294914	21	
Route_0621	1, 3, 7, 14, 23, 30, 35, 42, 51, 55, 66, 77, 81, 83, 84, 85	-0.24416	-0.2163	-1.92078	-1.406215	0.75651139	-3.03093
		171982.8	13	176.5251	11.084593	23	
Route_0142	1, 2, 5, 9, 18, 19, 33, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	-0.82893	-0.2163	-0.2756	-0.739819	-0.959803	-3.02045
		164842.9	13	233.8215	13.233694	13	
Route_0465	1, 3, 6, 8, 15, 24, 30, 41, 47, 55, 66, 77, 81, 83, 84, 85	-1.01145	-0.68744	-0.86833	-0.522614	0.06998564	-3.01984
		162614.4	11	213.1788	13.934171	19	
Route_0680	1, 3, 7, 15, 24, 30, 41, 47, 55, 62, 67, 72, 78, 83, 84, 85	-0.83752	-0.45187	-1.6349	-1.534072	1.44303715	-3.01533
		164738	12	186.4813	10.672257	27	
Route_0295	1, 2, 5, 10, 12, 19, 33, 36, 43, 52, 58, 64, 76, 80, 82, 85	-1.47232	-0.2163	-0.71349	-0.324394	-0.2732772	-2.99978
		156987.2	13	218.5714	14.573422	17	
Route_0014	1, 2, 4, 13, 21, 28, 27, 32, 36, 44, 48, 52, 58, 63, 68, 75, 82, 85	-0.80785	-1.15859	-0.0288	-0.203909	-0.7881716	-2.98732
		165100.2	9	242.4169	14.961982	14	
Route_0279	1, 2, 5, 10, 12, 19, 27, 32, 36, 44, 48, 52, 58, 63, 68, 75, 82, 85	-1.58079	-0.68744	0.132754	-0.404967	-0.4449087	-2.98535
		155662.9	11	248.0433	14.313577	16	
Route_0141	1, 2, 5, 9, 18, 19, 33, 37, 45, 50, 53, 59, 63, 68, 74, 85	-0.94244	-0.92302	0.361958	-0.348924	-1.1314344	-2.98386
		163457	10	256.0258	14.494316	12	
Route_0012	1, 2, 4, 13, 21, 28, 27, 32, 36, 44, 48, 52, 57, 68, 75, 82, 85	-0.82158	-1.15859	-0.13382	-0.235018	-0.6165401	-2.96555
		164932.6	9	238.7594	14.86166	15	
Route_0234	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 43, 52, 58, 63, 68, 75, 82, 85	-0.84868	-0.92302	0.423319	-0.48537	-1.1314344	-2.96519
		164601.7	10	258.1628	14.054282	12	
Route_0155	1, 2, 5, 9, 18, 19, 33, 44, 49, 59, 64, 76, 80, 82, 85	-1.33042	-0.2163	-1.2397	0.0947746	-0.2732772	-2.96492
		158719.8	13	200.245	15.925227	17	
Route_0277	1, 2, 5, 10, 12, 19, 27, 32, 36, 44, 48, 52, 57, 68, 75, 82, 85	-1.59451	-0.68744	0.027734	-0.436076	-0.2732772	-2.96358
		155495.3	11	244.3858	14.213255	17	
Route_0535	1, 3, 6, 16, 25, 24, 30, 41, 46, 54, 65, 81, 83, 84, 85	-0.18044	-0.2163	-0.62482	-1.152119	-0.7881716	-2.96185
		172760.8	13	221.6595	11.90404	14	
Route_0013	1, 2, 4, 13, 21, 28, 27, 32, 36, 44, 48, 52, 58, 63, 68, 74, 85	-0.92137	-1.86531	0.608763	0.1869857	-0.959803	-2.95073
		163714.3	6	264.6212	16.222604	13	
Route_0278	1, 2, 5, 10, 12, 19, 27, 32, 36, 44, 48, 52, 58, 63, 68, 74, 85	-1.6943	-1.39416	0.770315	-0.014072	-0.6165401	-2.94876
		154277	8	270.2476	15.5742	15	
Route_0232	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 43, 52, 57, 68, 75, 82, 85	-0.86241	-0.92302	0.318299	-0.516478	-0.959803	-2.94341
		164434.1	10	254.5053	13.953959	13	

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Route Data with Z-Score
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Route_0400	1, 3, 6, 8, 14, 23, 30, 34, 40, 54, 65, 81, 83, 84, 85	-0.02371	-0.45187	-1.33397	-1.364954	0.24161707	-2.93288
		174674.4	12	196.962	11.217658	20	
Route_0011	1, 2, 4, 13, 21, 28, 27, 32, 36, 44, 48, 52, 57, 68, 74, 85	-0.93509	-1.86531	0.503743	0.1558776	-0.7881716	-2.92896
		163546.7	6	260.9637	16.122282	14	
Route_0233	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 43, 52, 58, 63, 68, 74, 85	-0.9622	-1.62974	1.06088	-0.094475	-1.3030659	-2.92859
		163215.7	7	280.3671	15.314904	11	
Route_0276	1, 2, 5, 10, 12, 19, 27, 32, 36, 44, 48, 52, 57, 68, 74, 85	-1.70803	-1.39416	0.665295	-0.04518	-0.4449087	-2.92699
		154109.3	8	266.59	15.473877	16	
Route_0231	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 43, 52, 57, 68, 74, 85	-0.97592	-1.62974	0.95586	-0.125583	-1.1314344	-2.90682
		163048.1	7	276.7095	15.214582	12	
Route_0087	1, 2, 5, 9, 17, 32, 36, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	-0.8721	-0.68744	-0.14836	-0.238992	-0.959803	-2.9067
		164315.8	11	238.2528	14.848843	13	
Route_0711	1, 3, 7, 15, 31, 35, 41, 47, 55, 66, 77, 81, 83, 84, 85	-0.90659	-0.68744	-1.64181	0.9472521	-0.6165401	-2.90512
		163894.7	11	186.2408	18.674435	15	
Route_0135	1, 2, 5, 9, 18, 19, 33, 36, 43, 52, 58, 64, 76, 80, 82, 85	-1.34293	-0.2163	-0.53499	-0.331921	-0.4449087	-2.87104
		158567.1	13	224.788	14.54915	16	
Route_0086	1, 2, 5, 9, 17, 32, 36, 37, 45, 50, 53, 59, 63, 68, 74, 85	-0.98561	-1.39416	0.489198	0.1519034	-1.1314344	-2.87011
		162929.9	8	260.4571	16.109465	12	
Route_0119	1, 2, 5, 9, 18, 19, 27, 32, 36, 44, 48, 52, 58, 63, 68, 75, 82, 85	-1.45139	-0.68744	0.311254	-0.412494	-0.6165401	-2.85661
		157242.8	11	254.2599	14.289305	15	
Route_0239	1, 2, 5, 10, 11, 13, 21, 28, 33, 36, 43, 52, 58, 63, 68, 75, 82, 85	-0.84021	-0.45187	0.266728	-0.850693	-0.959803	-2.83584
		164705.2	12	252.7092	12.876129	13	
Route_0117	1, 2, 5, 9, 18, 19, 27, 32, 36, 44, 48, 52, 57, 68, 75, 82, 85	-1.46512	-0.68744	0.206233	-0.443602	-0.4449087	-2.83484
		157075.2	11	250.6024	14.188983	16	
Route_0118	1, 2, 5, 9, 18, 19, 27, 32, 36, 44, 48, 52, 58, 63, 68, 74, 85	-1.5649	-1.39416	0.948814	-0.021599	-0.7881716	-2.82002
		155856.9	8	276.4642	15.549927	14	
Route_0237	1, 2, 5, 10, 11, 13, 21, 28, 33, 36, 43, 52, 57, 68, 75, 82, 85	-0.85394	-0.45187	0.161708	-0.881801	-0.7881716	-2.81407
		164537.6	12	249.0517	12.775806	14	
Route_0238	1, 2, 5, 10, 11, 13, 21, 28, 33, 36, 43, 52, 58, 63, 68, 74, 85	-0.95372	-1.15859	0.904289	-0.459798	-1.1314344	-2.79925
		163319.2	9	274.9135	14.136751	12	
Route_0116	1, 2, 5, 9, 18, 19, 27, 32, 36, 44, 48, 52, 57, 68, 74, 85	-1.57863	-1.39416	0.843794	-0.052707	-0.6165401	-2.79825
		155689.2	8	272.8066	15.449605	15	
Route_0520	1, 3, 6, 16, 25, 24, 30, 34, 40, 54, 65, 81, 83, 84, 85	-0.07955	-0.2163	-0.72741	-1.31143	-0.4449087	-2.77959
		173992.6	13	218.0866	11.39027	16	
Route_0236	1, 2, 5, 10, 11, 13, 21, 28, 33, 36, 43, 52, 57, 68, 74, 85	-0.96745	-1.15859	0.799269	-0.490906	-0.959803	-2.77748
		163151.6	9	271.256	14.036428	13	
Route_0696	1, 3, 7, 15, 31, 35, 34, 40, 54, 65, 81, 83, 84, 85	0.088555	-0.92302	-1.71722	0.3980952	-0.6165401	-2.77013
		176045.1	10	183.6143	16.903424	15	
Route_0263	1, 2, 5, 10, 11, 13, 21, 29, 39, 50, 53, 59, 64, 76, 80, 82, 85	-0.4728	0.725998	-0.94261	-0.943909	-1.1314344	-2.76475
		169191.2	17	210.5918	12.57551	12	
Route_0597	1, 3, 7, 14, 22, 40, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	0.284451	-0.68744	-1.35706	-1.066497	0.06998564	-2.75656
		178437	11	196.1577	12.180168	19	
Route_0067	1, 2, 5, 9, 17, 27, 33, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	-0.85352	-0.2163	-0.75324	-0.144204	-0.7881716	-2.75544
		164542.6	13	217.1868	15.154529	14	
Route_0617	1, 3, 7, 14, 23, 30, 35, 42, 51, 55, 61, 65, 81, 83, 84, 85	0.657557	0.019277	-2.35099	-1.633071	0.58487995	-2.72235
		182992.5	14	161.542	10.35299	22	
Route_0066	1, 2, 5, 9, 17, 27, 33, 37, 45, 50, 53, 59, 63, 68, 74, 85	-0.96704	-0.92302	-0.11568	0.246691	-0.959803	-2.71884
		163156.7	10	239.3911	16.415152	13	
Route_0461	1, 3, 6, 8, 15, 24, 30, 41, 47, 55, 61, 65, 81, 83, 84, 85	-0.10973	-0.45187	-1.29854	-0.749471	-0.1016458	-2.71126
		173624.1	12	198.1957	13.202567	18	
Route_0080	1, 2, 5, 9, 17, 27, 33, 44, 49, 59, 64, 76, 80, 82, 85	-1.35502	-0.2163	-1.71734	0.6903894	-0.1016458	-2.69991
		158419.5	13	183.6104	17.846062	18	
Route_0596	1, 3, 7, 14, 22, 40, 46, 47, 55, 66, 77, 81, 83, 84, 85	-0.24265	-0.68744	-1.1138	-0.89209	0.24161707	-2.69437
		172001.2	11	204.6297	12.742624	20	
Route_0665	1, 3, 7, 15, 24, 30, 35, 42, 56, 67, 72, 73, 79, 84, 85	-0.73621	-1.15859	-1.10456	-0.613807	0.92814283	-2.68502
		165975	9	204.9516	13.640078	24	
Route_0037	1, 2, 4, 13, 21, 28, 33, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	-0.18539	-0.2163	-0.61565	-0.53557	-1.1314344	-2.68434
		172700.4	13	221.9785	13.892388	12	
Route_0207	1, 2, 5, 9, 18, 20, 21, 29, 39, 50, 53, 59, 63, 68, 75, 82, 85	-0.44941	-0.2163	0.831415	-1.710508	-1.1314344	-2.67623
		169476.8	13	272.3755	10.103259	12	
Route_0025	1, 2, 4, 13, 21, 28, 27, 32, 43, 52, 58, 64, 76, 80, 82, 85	-0.70787	-0.68744	-0.71845	0.2376508	-0.7881716	-2.66428
		166321	11	218.3986	16.385997	14	
Route_0290	1, 2, 5, 10, 12, 19, 27, 32, 43, 52, 58, 64, 76, 80, 82, 85	-1.4808	-0.2163	-0.55689	0.0365928	-0.4449087	-2.66231
		156883.7	13	224.025	15.737593	16	
Route_0036	1, 2, 4, 13, 21, 28, 33, 37, 45, 50, 53, 59, 63, 68, 74, 85	-0.2989	-0.92302	0.021906	-0.144675	-1.3030659	-2.64775
		171314.4	10	244.1828	15.15301	11	
Route_0206	1, 2, 5, 9, 18, 20, 21, 29, 39, 50, 53, 59, 63, 68, 74, 85	-0.56292	-0.92302	1.468976	-1.319613	-1.3030659	-2.63964
		168090.8	10	294.5798	11.363881	11	
Route_0666	1, 3, 7, 15, 24, 30, 35, 42, 56, 67, 72, 78, 83, 84, 85	-0.75086	-0.45187	-1.65444	-1.737124	1.95793146	-2.63636
		165796.1	12	185.8008	10.017421	30	
Route_0050	1, 2, 4, 13, 21, 28, 33, 44, 49, 59, 64, 76, 80, 82, 85	-0.68688	-0.2163	-1.57975	0.2990232	-0.4449087	-2.62882
		166577.2	13	188.4021	16.583921	16	

Appendix B
Z-Score Analysis
Route Data with Z-Score
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Schedule JD-D1

Route_0060	1, 2, 5, 9, 17, 27, 33, 36, 43, 52, 58, 64, 76, 80, 82, 85	-1.36752	-0.2163	-1.01262	0.263694	-0.2732772	-2.60603
		158266.8	13	208.1533	16.469986	17	
Route_0707	1, 3, 7, 15, 31, 35, 41, 47, 55, 61, 65, 81, 83, 84, 85	-0.00487	-0.45187	-2.07202	0.7203958	-0.7881716	-2.59654
		174904.4	12	171.2577	17.942832	14	
Route_0455	1, 3, 6, 8, 15, 24, 30, 41, 46, 54, 65, 81, 83, 84, 85	-0.1172	-0.45187	-0.84118	-0.912487	-0.2732772	-2.59601
		173533	12	214.1241	12.676847	17	
Route_0627	1, 3, 7, 14, 23, 30, 41, 46, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	0.729256	-0.2163	-1.68074	-1.150628	-0.2732772	-2.59169
		183867.9	13	184.8849	11.90885	17	
Route_0030	1, 2, 4, 13, 21, 28, 33, 36, 43, 52, 58, 64, 76, 80, 82, 85	-0.69939	-0.2163	-0.87504	-0.127672	-0.6165401	-2.53494
		166424.5	13	212.945	15.207844	15	
Route_0130	1, 2, 5, 9, 18, 19, 27, 32, 43, 52, 58, 64, 76, 80, 82, 85	-1.3514	-0.2163	-0.3784	0.0290664	-0.6165401	-2.53357
		158463.6	13	230.2416	15.71332	15	
Route_0661	1, 3, 7, 15, 24, 30, 35, 42, 51, 55, 66, 77, 81, 83, 84, 85	-0.23675	-0.2163	-1.53045	-1.113092	0.58487995	-2.51171
		172073.2	13	190.1189	12.029903	22	
Route_0019	1, 2, 4, 13, 21, 28, 27, 32, 36, 44, 49, 59, 63, 68, 75, 82, 85	-0.62219	-0.92302	-0.02881	0.0462408	-0.959803	-2.48759
		167367.1	10	242.4164	15.768707	13	
Route_0284	1, 2, 5, 10, 12, 19, 27, 32, 36, 44, 49, 59, 63, 68, 75, 82, 85	-1.39513	-0.45187	0.132737	-0.154817	-0.6165401	-2.48562
		157929.8	12	248.0427	15.120302	15	
Route_0701	1, 3, 7, 15, 31, 35, 41, 46, 54, 65, 81, 83, 84, 85	-0.01233	-0.45187	-1.61467	0.55738	-0.959803	-2.48129
		174813.3	12	187.1861	17.417112	13	
Route_0018	1, 2, 4, 13, 21, 28, 27, 32, 36, 44, 49, 59, 63, 68, 74, 85	-0.73571	-1.62974	0.608747	0.4371359	-1.1314344	-2.451
		165981.1	7	264.6206	17.029329	12	
Route_0283	1, 2, 5, 10, 12, 19, 27, 32, 36, 44, 49, 59, 63, 68, 74, 85	-1.50864	-1.15859	0.770298	0.2360778	-0.7881716	-2.44903
		156543.8	9	270.247	16.380925	14	
Route_0719	1, 3, 7, 15, 31, 42, 56, 67, 71, 77, 81, 83, 84, 85	-1.35664	-1.15859	-1.30784	1.1579846	0.24161707	-2.42347
		158399.7	9	197.8718	19.354039	20	
Route_0440	1, 3, 6, 8, 15, 24, 30, 34, 40, 54, 65, 81, 83, 84, 85	-0.01631	-0.45187	-0.94377	-1.071797	0.06998564	-2.41376
		174764.8	12	210.5512	12.163078	19	
Route_0612	1, 3, 7, 14, 23, 30, 34, 40, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	0.830146	-0.2163	-1.78333	-1.309938	0.06998564	-2.40943
		185099.8	13	181.312	11.39508	19	
Route_0255	1, 2, 5, 10, 11, 13, 21, 28, 33, 44, 48, 52, 58, 64, 76, 80, 82, 85	-0.70556	0.019277	-1.38523	-0.055969	-0.2732772	-2.40077
		166349.2	14	195.1765	15.439084	17	
Route_0592	1, 3, 7, 14, 22, 40, 46, 47, 55, 61, 65, 81, 83, 84, 85	0.659059	-0.45187	-1.54401	-1.118947	0.06998564	-2.38579
		183010.8	12	189.6467	12.011021	19	
Route_0100	1, 2, 5, 9, 17, 32, 36, 44, 49, 59, 64, 76, 80, 82, 85	-1.37359	-0.2163	-1.11348	0.595697	-0.2732772	-2.38095
		158192.7	13	204.6409	17.540683	17	
Route_0124	1, 2, 5, 9, 18, 19, 27, 32, 36, 44, 49, 59, 63, 68, 75, 82, 85	-1.26573	-0.45187	0.311237	-0.162344	-0.7881716	-2.35688
		159509.7	12	254.2593	15.09603	14	
Route_0611	1, 3, 7, 14, 23, 30, 34, 40, 46, 47, 55, 66, 77, 81, 83, 84, 85	0.30304	-0.2163	-1.54008	-1.135531	0.24161707	-2.34725
		178664	13	189.7838	11.957539	20	
Route_0367	1, 2, 5, 10, 12, 20, 21, 29, 39, 50, 53, 59, 63, 68, 75, 82, 85	-0.5788	0.254851	0.652484	-1.702977	-0.959803	-2.33425
		167896.9	15	266.1439	10.127545	13	
Route_0123	1, 2, 5, 9, 18, 19, 27, 32, 36, 44, 49, 59, 63, 68, 74, 85	-1.37924	-1.15859	0.948798	0.2285515	-0.959803	-2.32029
		158123.7	9	276.4636	16.356652	13	
Route_0366	1, 2, 5, 10, 12, 20, 21, 29, 39, 50, 53, 59, 63, 68, 74, 85	-0.69232	-0.45187	1.290045	-1.312082	-1.1314344	-2.29766
		166510.9	12	288.3482	11.388167	12	
Route_0055	1, 2, 4, 13, 21, 29, 39, 50, 60, 70, 80, 82, 85	-0.1934	0.019277	0.164137	-1.31846	-0.959803	-2.28825
		172602.6	14	249.1363	11.367597	13	
Route_0717	1, 3, 7, 15, 31, 42, 56, 62, 61, 65, 81, 83, 84, 85	-0.07167	-0.92302	-1.87467	0.5557028	0.06998564	-2.24367
		174088.8	10	178.131	17.411703	19	
Route_0657	1, 3, 7, 15, 24, 30, 35, 42, 51, 55, 61, 65, 81, 83, 84, 85	0.664962	0.019277	-1.96067	-1.339948	0.41324851	-2.20313
		183082.9	14	175.1358	11.2983	21	
Route_0718	1, 3, 7, 15, 31, 42, 56, 62, 66, 77, 81, 83, 84, 85	-0.97339	-0.68744	-1.44444	0.7825652	0.24161707	-2.08109
		163079.1	11	193.1145	18.143326	20	
Route_0199	1, 2, 5, 9, 18, 20, 21, 28, 33, 44, 48, 52, 58, 63, 68, 75, 82, 85	-0.68217	-0.68744	0.388886	-0.822535	-0.2732772	-2.07654
		166634.7	11	256.9636	12.966938	17	
Route_0667	1, 3, 7, 15, 24, 30, 41, 46, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	0.736661	-0.2163	-1.29042	-0.857505	-0.4449087	-2.07247
		183958.3	13	198.4787	12.854161	16	
Route_0197	1, 2, 5, 9, 18, 20, 21, 28, 33, 44, 48, 52, 57, 68, 75, 82, 85	-0.6959	-0.68744	0.283865	-0.853643	-0.1016458	-2.05477
		166467.1	11	253.306	12.866616	18	
Route_0198	1, 2, 5, 9, 18, 20, 21, 28, 33, 44, 48, 52, 58, 63, 68, 74, 85	-0.79569	-1.39416	1.026446	-0.43164	-0.4449087	-2.03995
		165248.8	8	279.1678	14.22756	16	
Route_0607	1, 3, 7, 14, 23, 30, 34, 40, 46, 47, 55, 61, 65, 81, 83, 84, 85	1.204754	0.019277	-1.97029	-1.362387	0.06998564	-2.03866
		189673.6	14	174.8007	11.225935	19	
Route_0224	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 44, 48, 52, 58, 63, 68, 75, 82, 85	-0.64087	-0.45187	0.1658	-0.308719	-0.7881716	-2.02383
		167139	12	249.1942	14.623975	14	
Route_0196	1, 2, 5, 9, 18, 20, 21, 28, 33, 44, 48, 52, 57, 68, 74, 85	-0.80942	-1.39416	0.921426	-0.462748	-0.2732772	-2.01818
		165081.2	8	275.5103	14.127238	17	
Route_0222	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 44, 48, 52, 57, 68, 75, 82, 85	-0.6546	-0.45187	0.06078	-0.339827	-0.6165401	-2.00206
		166971.4	12	245.5367	14.523653	15	
Route_0223	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 44, 48, 52, 58, 63, 68, 74, 85	-0.75439	-1.15859	0.803361	0.0821762	-0.959803	-1.98724
		165753	9	271.3985	15.884597	13	

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Z-Score Analysis
Route Data with Z-Score
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Route_0221	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 44, 48, 52, 57, 68, 74, 85	-0.76811	-1.15859	0.698341	0.0510681	-0.7881716	-1.96547
		165585.4	9	267.7409	15.784275	14	
Route_0652	1, 3, 7, 15, 24, 30, 34, 40, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	0.837551	-0.2163	-1.39301	-1.016815	-0.1016458	-1.89021
		185190.2	13	194.9058	12.340391	18	
Route_0651	1, 3, 7, 15, 24, 30, 34, 40, 46, 47, 55, 66, 77, 81, 83, 84, 85	0.310445	-0.2163	-1.14975	-0.842408	0.06998564	-1.82802
		178754.4	13	203.3776	12.902849	19	
Route_0418	1, 3, 6, 8, 14, 23, 30, 41, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	-0.38692	-0.2163	-0.84573	-0.362668	0.06998564	-1.74163
		170239.7	13	213.9656	14.449993	19	
Route_0359	1, 2, 5, 10, 12, 20, 21, 28, 33, 44, 48, 52, 58, 63, 68, 75, 82, 85	-0.81157	-0.2163	0.209955	-0.815004	-0.1016458	-1.73456
		165054.8	13	250.732	12.991224	18	
Route_0015	1, 2, 4, 13, 21, 28, 27, 32, 36, 44, 48, 52, 58, 64, 76, 80, 82, 85	-0.50006	-0.2163	-0.97597	0.414302	-0.4449087	-1.72293
		168858.3	13	209.43	16.955691	16	
Route_0280	1, 2, 5, 10, 12, 19, 27, 32, 36, 44, 48, 52, 58, 64, 76, 80, 82, 85	-1.27299	0.254851	-0.81441	0.2132439	-0.1016458	-1.72096
		159421	15	215.0564	16.307286	18	
Route_0247	1, 2, 5, 10, 11, 13, 21, 28, 33, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	-0.01841	0.490424	-0.42106	-0.64038	-1.1314344	-1.72086
		174739.1	16	228.7558	13.554381	12	
Route_0357	1, 2, 5, 10, 12, 20, 21, 28, 33, 44, 48, 52, 57, 68, 75, 82, 85	-0.8253	-0.2163	0.104934	-0.846112	0.06998564	-1.71279
		164887.2	13	247.0744	12.890901	19	
Route_0235	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 43, 52, 58, 64, 76, 80, 82, 85	-0.54089	0.019277	-0.52385	0.1328413	-0.7881716	-1.70079
		168359.8	14	225.1759	16.047991	14	
Route_0358	1, 2, 5, 10, 12, 20, 21, 28, 33, 44, 48, 52, 58, 63, 68, 74, 85	-0.92508	-0.92302	0.847516	-0.424109	-0.2732772	-1.69797
		163668.9	10	272.9362	14.251846	17	
Route_0246	1, 2, 5, 10, 11, 13, 21, 28, 33, 37, 45, 50, 53, 59, 63, 68, 74, 85	-0.13192	-0.2163	0.216504	-0.249485	-1.3030659	-1.68427
		173353.2	13	250.9601	14.815004	11	
Route_0356	1, 2, 5, 10, 12, 20, 21, 28, 33, 44, 48, 52, 57, 68, 74, 85	-0.93881	-0.92302	0.742495	-0.455217	-0.1016458	-1.6762
		163501.3	10	269.2787	14.151523	18	
Route_0260	1, 2, 5, 10, 11, 13, 21, 28, 33, 44, 49, 59, 64, 76, 80, 82, 85	-0.51991	0.490424	-1.38515	0.1942137	-0.4449087	-1.66533
		168616	16	195.1793	16.245914	16	
Route_0303	1, 2, 5, 10, 12, 19, 33, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	-0.65053	0.961571	-1.40117	-0.114049	-0.4449087	-1.64909
		167021.1	18	194.6213	15.25178	16	
Route_0120	1, 2, 5, 9, 18, 19, 27, 32, 36, 44, 48, 52, 58, 64, 76, 80, 82, 85	-1.14359	0.254851	-0.63591	0.2057176	-0.2732772	-1.59222
		161000.9	15	221.273	16.283014	17	
Route_0538	1, 3, 6, 16, 25, 24, 30, 41, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	-0.44276	0.019277	-0.23917	-0.309144	-0.6165401	-1.58834
		169557.9	14	235.0902	14.622605	15	
Route_0204	1, 2, 5, 9, 18, 20, 21, 28, 33, 44, 49, 59, 63, 68, 75, 82, 85	-0.49652	-0.45187	0.388869	-0.572385	-0.4449087	-1.57681
		168901.6	12	256.963	13.773663	16	
Route_0297	1, 2, 5, 10, 12, 19, 33, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	-0.2164	-0.2163	0.492957	-0.67644	-0.959803	-1.57598
		172321.7	13	260.588	13.438089	13	
Route_0240	1, 2, 5, 10, 11, 13, 21, 28, 33, 36, 43, 52, 58, 64, 76, 80, 82, 85	-0.53241	0.490424	-0.68044	-0.232482	-0.6165401	-1.57145
		168463.3	16	219.7223	14.869837	15	
Route_0416	1, 3, 6, 8, 14, 23, 30, 41, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	0.898045	0.019277	-1.41256	-0.964949	-0.1016458	-1.56183
		185928.8	14	194.2248	12.507656	18	
Route_0203	1, 2, 5, 9, 18, 20, 21, 28, 33, 44, 49, 59, 63, 68, 74, 85	-0.61003	-1.15859	1.02643	-0.18149	-0.6165401	-1.54022
		167515.6	9	279.1673	15.034285	15	
Route_0296	1, 2, 5, 10, 12, 19, 33, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	-0.32991	-0.92302	1.130518	-0.285545	-1.1314344	-1.53939
		170935.8	10	282.7923	14.698712	12	
Route_0598	1, 3, 7, 14, 22, 40, 54, 61, 62, 67, 72, 73, 79, 84, 85	0.232166	-1.15859	-0.6943	-0.674516	0.75651139	-1.53872
		177798.6	9	219.2397	13.444294	23	
Route_0229	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 44, 49, 59, 63, 68, 75, 82, 85	-0.45522	-0.2163	0.165783	-0.058569	-0.959803	-1.5241
		169405.8	13	249.1936	15.4307	13	
Route_0143	1, 2, 5, 9, 18, 19, 33, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	-0.52113	0.961571	-1.22267	-0.121575	-0.6165401	-1.52035
		168601	18	200.8379	15.227508	15	
Route_0647	1, 3, 7, 15, 24, 30, 34, 40, 46, 47, 55, 61, 65, 81, 83, 84, 85	1.212159	0.019277	-1.57997	-1.069264	-0.1016458	-1.51944
		189764.1	14	188.3945	12.171246	18	
Route_0007	1, 2, 4, 13, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	0.187096	-0.2163	-0.01077	-0.170204	-1.3030659	-1.51324
		177248.3	13	243.0448	15.070681	11	
Route_0272	1, 2, 5, 10, 12, 19, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	-0.58584	0.254851	0.150782	-0.371262	-0.959803	-1.51127
		167811	15	248.6711	14.422276	13	
Route_0599	1, 3, 7, 14, 22, 40, 54, 61, 62, 67, 72, 78, 83, 84, 85	0.217512	-0.45187	-1.24418	-1.797833	1.78630002	-1.49007
		177619.7	12	200.089	9.821638	29	
Route_0228	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 44, 49, 59, 63, 68, 74, 85	-0.56873	-0.92302	0.803344	0.3323264	-1.1314344	-1.48751
		168019.9	10	271.3979	16.691322	12	
Route_0006	1, 2, 4, 13, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 74, 85	0.073583	-0.92302	0.626791	0.2206912	-1.4746973	-1.47665
		175862.3	10	265.2491	16.331303	10	
Route_0271	1, 2, 5, 10, 12, 19, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 74, 85	-0.69935	-0.45187	0.788343	0.0196332	-1.1314344	-1.47468
		166425	12	270.8754	15.682899	12	
Route_0137	1, 2, 5, 9, 18, 19, 33, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	-0.087	-0.2163	0.671456	-0.683966	-1.1314344	-1.44724
		173901.6	13	266.8046	13.413817	12	
Route_0136	1, 2, 5, 9, 18, 19, 33, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	-0.20052	-0.92302	1.309017	-0.293071	-1.3030659	-1.41065
		172515.7	10	289.0089	14.67444	11	
Route_0536	1, 3, 6, 16, 25, 24, 30, 41, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	0.842204	0.254851	-0.806	-0.911426	-0.7881716	-1.40854
		185247	15	215.3494	12.680269	14	

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Route_0088	1, 2, 5, 9, 17, 32, 36, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	-0.5643	0.490424	-1.09543	0.3792523	-0.6165401	-1.4066
		168073.9	16	205.2693	16.842657	15	
Route_0417	1, 3, 6, 8, 14, 23, 30, 41, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	-0.00367	0.254851	-0.98233	-0.738087	0.06998564	-1.39925
		174919.1	15	209.2084	13.239279	19	
Route_0112	1, 2, 5, 9, 18, 19, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	-0.45644	0.254851	0.329281	-0.378788	-1.1314344	-1.38253
		169390.9	15	254.8877	14.398004	12	
Route_0179	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 43, 52, 58, 63, 68, 75, 82, 85	-0.5175	-0.68744	1.25027	-0.633724	-0.7881716	-1.37657
		168645.4	11	286.9629	13.575845	14	
Route_0628	1, 3, 7, 14, 23, 30, 41, 46, 54, 61, 62, 67, 72, 73, 79, 84, 85	0.676971	-0.68744	-1.01798	-0.758646	0.41324851	-1.37385
		183229.5	11	207.9669	13.172977	21	
Route_0177	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 43, 52, 57, 68, 75, 82, 85	-0.53123	-0.68744	1.14525	-0.664833	-0.6165401	-1.35479
		168477.8	11	283.3054	13.475522	15	
Route_0111	1, 2, 5, 9, 18, 19, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 74, 85	-0.56995	-0.45187	0.966842	0.0121068	-1.3030659	-1.34594
		168004.9	12	277.092	15.658626	11	
Route_0178	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 43, 52, 58, 63, 68, 74, 85	-0.63101	-1.39416	1.887831	-0.242829	-0.959803	-1.33998
		167259.4	8	309.1672	14.836467	13	
Route_0082	1, 2, 5, 9, 17, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	-0.13017	-0.68744	0.798696	-0.183139	-1.1314344	-1.33349
		173374.5	11	271.236	15.028966	12	
Route_0629	1, 3, 7, 14, 23, 30, 41, 46, 54, 61, 62, 67, 72, 78, 83, 84, 85	0.662317	0.019277	-1.56786	-1.881964	1.44303715	-1.32519
		183050.6	14	188.8161	9.5503201	27	
Route_0265	1, 2, 5, 10, 11, 13, 21, 29, 39, 50, 60, 70, 80, 82, 85	-0.02642	0.725998	0.358734	-1.42327	-0.959803	-1.32476
		174641.3	17	255.9135	11.02959	13	
Route_0176	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 43, 52, 57, 68, 74, 85	-0.64474	-1.39416	1.782811	-0.273937	-0.7881716	-1.3182
		167091.8	8	305.5097	14.736144	14	
Route_0081	1, 2, 5, 9, 17, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	-0.24369	-1.39416	1.436257	0.2077562	-1.3030659	-1.2969
		171988.6	8	293.4403	16.289588	11	
Route_0422	1, 3, 6, 8, 14, 23, 30, 41, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.48107	-0.2163	-0.82827	-0.339655	0.58487995	-1.28041
		169090.2	13	214.5737	14.524208	22	
Route_0068	1, 2, 5, 9, 17, 27, 33, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	-0.54573	0.961571	-1.70031	0.4740399	-0.4449087	-1.25534
		168300.7	18	184.2033	17.148343	16	
Route_0184	1, 2, 5, 9, 18, 20, 21, 28, 33, 36, 43, 52, 58, 63, 68, 75, 82, 85	-0.50902	-0.2163	1.093679	-0.999047	-0.6165401	-1.24723
		168748.9	13	281.5093	12.397692	15	
Route_0537	1, 3, 6, 16, 25, 24, 30, 41, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	-0.05951	0.490424	-0.37577	-0.684563	-0.6165401	-1.24596
		174237.3	16	230.333	13.411892	15	
Route_0364	1, 2, 5, 10, 12, 20, 21, 28, 33, 44, 49, 59, 63, 68, 75, 82, 85	-0.62591	0.019277	0.209938	-0.564854	-0.2732772	-1.23483
		167321.7	14	250.7314	13.797949	17	
Route_0182	1, 2, 5, 9, 18, 20, 21, 28, 33, 36, 43, 52, 57, 68, 75, 82, 85	-0.52275	-0.2163	0.988659	-1.030156	-0.4449087	-1.22545
		168581.2	13	277.8518	12.297369	16	
Route_0458	1, 3, 6, 8, 15, 24, 30, 41, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	-0.37951	-0.2163	-0.45554	-0.069511	-0.1016458	-1.22251
		170330.1	13	227.5548	15.395413	18	
Route_0183	1, 2, 5, 9, 18, 20, 21, 28, 33, 36, 43, 52, 58, 63, 68, 74, 85	-0.62254	-0.92302	1.73124	-0.608152	-0.7881716	-1.21064
		167362.9	10	303.7136	13.658314	14	
Route_0720	1, 3, 7, 15, 31, 42, 56, 67, 72, 73, 79, 84, 85	-1.40892	-1.62974	-0.64509	1.5499662	0.92814283	-1.20564
		157761.3	7	220.9534	20.618166	24	
Route_0363	1, 2, 5, 10, 12, 20, 21, 28, 33, 44, 49, 59, 63, 68, 74, 85	-0.73943	-0.68744	0.847499	-0.173959	-0.4449087	-1.19824
		165935.7	11	272.9357	15.058571	16	
Route_0613	1, 3, 7, 14, 23, 30, 34, 40, 54, 61, 62, 67, 72, 73, 79, 84, 85	0.777861	-0.68744	-1.12057	-0.917957	0.75651139	-1.1916
		184461.4	11	204.394	12.659207	23	
Route_0181	1, 2, 5, 9, 18, 20, 21, 28, 33, 36, 43, 52, 57, 68, 74, 85	-0.63626	-0.92302	1.62622	-0.63926	-0.6165401	-1.18886
		167195.3	10	300.0561	13.557991	15	
Route_0038	1, 2, 4, 13, 21, 28, 33, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	0.122406	0.961571	-1.56273	0.0826737	-0.7881716	-1.18425
		176458.5	18	188.995	15.886202	14	
Route_0062	1, 2, 5, 9, 17, 27, 33, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	-0.1116	-0.2163	0.193819	-0.088351	-0.959803	-1.18223
		173601.3	13	250.17	15.334653	13	
Route_0208	1, 2, 5, 9, 18, 20, 21, 29, 39, 50, 53, 59, 64, 76, 80, 82, 85	-0.14161	0.961571	-0.11566	-1.092264	-0.7881716	-1.17613
		173234.8	18	239.3919	12.097073	14	
Route_0054	1, 2, 4, 13, 21, 29, 39, 50, 60, 69, 76, 80, 82, 85	-0.58644	0.254851	0.14341	0.1489085	-1.1314344	-1.17071
		167803.6	15	248.4144	16.099807	12	
Route_0721	1, 3, 7, 15, 31, 42, 56, 67, 72, 78, 83, 84, 85	-1.42358	-0.92302	-1.19497	0.4266489	1.95793146	-1.15699
		157582.4	10	201.8027	16.995509	30	
Route_0061	1, 2, 5, 9, 17, 27, 33, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	-0.22511	-0.92302	0.83138	0.3025438	-1.1314344	-1.14564
		172215.3	10	272.3743	16.595275	12	
Route_0614	1, 3, 7, 14, 23, 30, 34, 40, 54, 61, 62, 67, 72, 78, 83, 84, 85	0.763207	0.019277	-1.67045	-2.041274	1.78630002	-1.14294
		184282.5	14	185.2433	9.0365502	29	
Route_0542	1, 3, 6, 16, 25, 24, 30, 41, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.53691	0.019277	-0.22171	-0.286131	-0.1016458	-1.12712
		168408.4	14	235.6983	14.69682	18	
Route_0032	1, 2, 4, 13, 21, 28, 33, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	0.556534	-0.2163	0.331405	-0.479717	-1.3030659	-1.11114
		181759	13	254.9617	14.072511	11	
Route_0704	1, 3, 7, 15, 31, 35, 41, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	-0.27465	-0.2163	-1.22902	1.4003557	-0.7881716	-1.10779
		171610.5	13	200.6168	20.135677	14	
Route_0031	1, 2, 4, 13, 21, 28, 33, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	0.443021	-0.92302	0.968966	-0.088822	-1.4746973	-1.07455
		180373.1	10	277.166	15.333134	10	

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Route_0456	1, 3, 6, 8, 15, 24, 30, 41, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	0.90545	0.019277	-1.02237	-0.671793	-0.2732772	-1.04271
		186019.2	14	207.814	13.453076	17	
Route_0339	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 43, 52, 58, 63, 68, 75, 82, 85	-0.6469	-0.2163	1.071339	-0.626194	-0.6165401	-1.03459
		167065.5	13	280.7313	13.60013	15	
Route_0716	1, 3, 7, 15, 31, 42, 51, 55, 66, 77, 81, 83, 84, 85	-0.90947	-0.68744	-1.07099	1.0506816	0.58487995	-1.03234
		163859.5	11	206.1207	19.007991	22	
Route_0384	1, 3, 6, 8, 14, 22, 40, 54, 61, 66, 77, 81, 83, 84, 85	0.043585	-0.2163	-0.47747	-0.786407	0.41324851	-1.02334
		175496.1	13	226.7911	13.083449	21	
Route_0337	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 43, 52, 57, 68, 75, 82, 85	-0.66062	-0.2163	0.966319	-0.657302	-0.4449087	-1.01281
		166897.9	13	277.0738	13.499808	16	
Route_0338	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 43, 52, 58, 63, 68, 74, 85	-0.76041	-0.92302	1.7089	-0.235299	-0.7881716	-0.998
		165679.5	10	302.9356	14.860752	14	
Route_0020	1, 2, 4, 13, 21, 28, 27, 32, 36, 44, 49, 59, 64, 76, 80, 82, 85	-0.3144	0.254851	-0.97589	0.6644848	-0.6165401	-0.98749
		171125.2	15	209.4328	17.762521	15	
Route_0285	1, 2, 5, 10, 12, 19, 27, 32, 36, 44, 49, 59, 64, 76, 80, 82, 85	-1.08733	0.725998	-0.81433	0.4634267	-0.2732772	-0.98552
		161687.8	17	215.0592	17.114116	17	
Route_0336	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 43, 52, 57, 68, 74, 85	-0.77414	-0.92302	1.60388	-0.266407	-0.6165401	-0.97622
		165511.9	10	299.2781	14.76043	15	
Route_0702	1, 3, 7, 15, 31, 35, 41, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	1.010311	0.019277	-1.79585	0.7980739	-0.959803	-0.92799
		187299.5	14	180.876	18.193341	13	
Route_0586	1, 3, 6, 16, 26, 79, 84, 85	-2.16645	-2.33646	0.33026	3.1931695	0.06998564	-0.9095
		148512.1	4	254.9218	25.917435	19	
Route_0344	1, 2, 5, 10, 12, 20, 21, 28, 33, 36, 43, 52, 58, 63, 68, 75, 82, 85	-0.63842	0.254851	0.914748	-0.991517	-0.4449087	-0.90525
		167169	15	275.2777	12.421977	16	
Route_0408	1, 3, 6, 8, 14, 23, 30, 35, 42, 56, 67, 71, 77, 81, 83, 84, 85	-0.3944	-0.2163	-0.8478	-0.542707	1.09977427	-0.90143
		170148.3	13	213.8936	13.869372	25	
Route_0589	1, 3, 7, 14, 22, 40, 46, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	0.389278	-0.2163	-0.70101	-0.438987	0.06998564	-0.89703
		179716.9	13	219.0057	14.203867	19	
Route_0342	1, 2, 5, 10, 12, 20, 21, 28, 33, 36, 43, 52, 57, 68, 75, 82, 85	-0.65215	0.254851	0.809728	-1.022625	-0.2732772	-0.88347
		167001.3	15	271.6202	12.321655	17	
Route_0457	1, 3, 6, 8, 15, 24, 30, 41, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	0.003736	0.254851	-0.59214	-0.44493	-0.1016458	-0.88013
		175009.5	15	222.7976	14.184699	18	
Route_0343	1, 2, 5, 10, 12, 20, 21, 28, 33, 36, 43, 52, 58, 63, 68, 74, 85	-0.75193	-0.45187	1.552309	-0.600622	-0.6165401	-0.86866
		165783	12	297.482	13.682599	15	
Route_0414	1, 3, 6, 8, 14, 23, 30, 41, 46, 54, 61, 66, 77, 81, 83, 84, 85	0.48839	0.254851	-0.80115	-0.870538	0.06998564	-0.85846
		180927	15	215.5182	12.812131	19	
Route_0125	1, 2, 5, 9, 18, 19, 27, 32, 36, 44, 49, 59, 64, 76, 80, 82, 85	-0.95794	0.725998	-0.63583	0.4559004	-0.4449087	-0.85678
		163267.7	17	221.2757	17.089844	16	
Route_0668	1, 3, 7, 15, 24, 30, 41, 46, 54, 61, 62, 67, 72, 73, 79, 84, 85	0.684375	-0.68744	-0.62765	-0.465523	0.24161707	-0.85463
		183320	11	221.5607	14.118287	20	
Route_0341	1, 2, 5, 10, 12, 20, 21, 28, 33, 36, 43, 52, 57, 68, 74, 85	-0.76566	-0.45187	1.447289	-0.63173	-0.4449087	-0.84688
		165615.4	12	293.8245	13.582277	16	
Route_0368	1, 2, 5, 10, 12, 20, 21, 29, 39, 50, 53, 59, 64, 76, 80, 82, 85	-0.27101	1.432718	-0.29459	-1.084733	-0.6165401	-0.83415
		171654.9	20	233.1603	12.121358	15	
Route_0200	1, 2, 5, 9, 18, 20, 21, 28, 33, 44, 48, 52, 58, 64, 76, 80, 82, 85	-0.37438	0.254851	-0.55828	-0.204323	0.06998564	-0.81215
		170392.8	15	223.9766	14.960647	19	
Route_0669	1, 3, 7, 15, 24, 30, 41, 46, 54, 61, 62, 67, 72, 78, 83, 84, 85	0.669722	0.019277	-1.17754	-1.588841	1.27140571	-0.80597
		183141	14	202.4099	10.495631	26	
Route_0618	1, 3, 7, 14, 23, 30, 35, 42, 51, 55, 62, 67, 71, 77, 81, 83, 84, 85	0.29363	0.254851	-1.49053	-0.930098	1.09977427	-0.77238
		178549.1	15	191.5093	12.62005	25	
Route_0703	1, 3, 7, 15, 31, 35, 41, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	0.108597	0.254851	-1.36562	1.0249363	-0.7881716	-0.76541
		176289.9	15	195.8596	18.924964	14	
Route_0462	1, 3, 6, 8, 15, 24, 30, 41, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.47366	-0.2163	-0.43808	-0.046498	0.41324851	-0.76129
		169180.6	13	228.1629	15.469628	21	
Route_0225	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 44, 48, 52, 58, 64, 76, 80, 82, 85	-0.33308	0.490424	-0.78137	0.3094925	-0.4449087	-0.75944
		170897.1	16	216.2073	16.617684	16	
Route_0528	1, 3, 6, 16, 25, 24, 30, 35, 42, 56, 67, 71, 77, 81, 83, 84, 85	-0.45024	0.019277	-0.24124	-0.489183	0.41324851	-0.74814
		169466.5	14	235.0182	14.041984	21	
Route_0712	1, 3, 7, 15, 31, 42, 51, 55, 61, 65, 81, 83, 84, 85	-0.00776	-0.45187	-1.5012	0.8238253	0.41324851	-0.72375
		174869.2	12	191.1377	18.276388	21	
Route_0406	1, 3, 6, 8, 14, 23, 30, 35, 42, 56, 62, 61, 65, 81, 83, 84, 85	0.890561	0.019277	-1.41463	-1.144989	0.92814283	-0.72163
		185837.4	14	194.1529	11.927035	24	
Route_0587	1, 3, 7, 14, 22, 40, 46, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	1.674242	0.019277	-1.26784	-1.041269	-0.1016458	-0.71724
		195406	14	199.2649	12.26153	18	
Route_0534	1, 3, 6, 16, 25, 24, 30, 41, 46, 54, 61, 66, 77, 81, 83, 84, 85	0.432549	0.490424	-0.19459	-0.817014	-0.6165401	-0.70517
		180245.2	16	236.6428	12.984744	15	
Route_0399	1, 3, 6, 8, 14, 23, 30, 34, 40, 54, 61, 66, 77, 81, 83, 84, 85	0.58928	0.254851	-0.90374	-1.029848	0.41324851	-0.67621
		182158.9	15	211.9453	12.298361	21	
Route_0653	1, 3, 7, 15, 24, 30, 34, 40, 54, 61, 62, 67, 72, 73, 79, 84, 85	0.785266	-0.68744	-0.73024	-0.624834	0.58487995	-0.67237
		184551.8	11	217.9878	13.604517	22	
Route_0708	1, 3, 7, 15, 31, 35, 41, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.3688	-0.2163	-1.21156	1.4233683	-0.2732772	-0.64657
		170461	13	201.2249	20.209892	17	

Appendix B
Z-Score Analysis
Route Data with Z-Score
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Schedule JD-D1

Route_0312	1, 2, 5, 10, 12, 19, 33, 44, 49, 53, 60, 70, 80, 82, 85	-0.43896	0.019277	0.0247	-0.313905	0.06998564	-0.6389
		169604.3	14	244.2801	14.607249	19	
Route_0654	1, 3, 7, 15, 24, 30, 34, 40, 54, 61, 62, 67, 72, 78, 83, 84, 85	0.770612	0.019277	-1.28013	-1.748151	1.61466858	-0.62372
		184372.9	14	198.8371	9.9818609	28	
Route_0526	1, 3, 6, 16, 25, 24, 30, 35, 42, 56, 62, 61, 65, 81, 83, 84, 85	0.83472	0.254851	-0.80807	-1.091465	0.24161707	-0.56834
		185155.6	15	215.2775	12.099648	20	
Route_0407	1, 3, 6, 8, 14, 23, 30, 35, 42, 56, 62, 66, 77, 81, 83, 84, 85	-0.01115	0.254851	-0.9844	-0.918127	1.09977427	-0.55905
		174827.7	15	209.1364	12.658658	25	
Route_0588	1, 3, 7, 14, 22, 40, 46, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	0.772528	0.254851	-0.83761	-0.814406	0.06998564	-0.55465
		184396.3	15	214.2485	12.993153	19	
Route_0604	1, 3, 7, 14, 23, 30, 34, 40, 46, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	0.934973	0.254851	-1.12729	-0.682427	0.06998564	-0.54991
		186379.7	15	204.1598	13.418781	19	
Route_0217	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	0.354074	0.490424	0.183828	-0.275013	-1.3030659	-0.54975
		179287.1	16	249.822	14.732674	11	
Route_0419	1, 3, 6, 8, 14, 23, 30, 41, 47, 51, 56, 67, 72, 73, 79, 84, 85	-0.43921	-0.68744	-0.18298	0.029314	0.75651139	-0.5238
		169601.3	11	237.0472	15.714119	23	
Route_0519	1, 3, 6, 16, 25, 24, 30, 34, 40, 54, 61, 66, 77, 81, 83, 84, 85	0.53344	0.490424	-0.29718	-0.976324	-0.2732772	-0.52292
		181477.1	16	233.0699	12.470974	17	
Route_0695	1, 3, 7, 15, 31, 35, 34, 40, 54, 61, 66, 77, 81, 83, 84, 85	0.701547	-0.2163	-1.287	0.7332009	-0.4449087	-0.51346
		183529.6	13	198.5976	17.984128	16	
Route_0216	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 74, 85	0.240561	-0.2163	0.821389	0.1158817	-1.4746973	-0.51316
		177901.1	13	272.0263	15.993297	10	
Route_0152	1, 2, 5, 9, 18, 19, 33, 44, 49, 53, 60, 70, 80, 82, 85	-0.30956	0.019277	0.2032	-0.321432	-0.1016458	-0.51016
		171184.2	14	250.4967	14.582977	18	
Route_0420	1, 3, 6, 8, 14, 23, 30, 41, 47, 51, 56, 67, 72, 78, 83, 84, 85	-0.45386	0.019277	-0.73286	-1.094003	1.78630002	-0.47515
		169422.4	14	217.8965	12.091463	29	
Route_0360	1, 2, 5, 10, 12, 20, 21, 28, 33, 44, 48, 52, 58, 64, 76, 80, 82, 85	-0.50378	0.725998	-0.73721	-0.196793	0.24161707	-0.47017
		168812.9	17	217.745	14.984932	20	
Route_0593	1, 3, 7, 14, 22, 40, 46, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	0.295132	-0.2163	-0.68355	-0.415974	0.58487995	-0.43581
		178567.4	13	219.6139	14.278081	22	
Route_0169	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 44, 48, 52, 58, 63, 68, 75, 82, 85	-0.30969	-0.2163	0.992751	-0.457073	-0.4449087	-0.43522
		171182.7	13	277.9943	14.145538	16	
Route_0167	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 44, 48, 52, 57, 68, 75, 82, 85	-0.32342	-0.2163	0.887731	-0.488181	-0.2732772	-0.41344
		171015.1	13	274.3368	14.045216	17	
Route_0527	1, 3, 6, 16, 25, 24, 30, 35, 42, 56, 62, 66, 77, 81, 83, 84, 85	-0.06699	0.490424	-0.37784	-0.864603	0.41324851	-0.40576
		174145.9	16	230.261	12.831271	21	
Route_0168	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 44, 48, 52, 58, 63, 68, 74, 85	-0.4232	-0.92302	1.630312	-0.066178	-0.6165401	-0.39863
		169796.7	10	300.1986	15.40616	15	
Route_0448	1, 3, 6, 8, 15, 24, 30, 35, 42, 56, 67, 71, 77, 81, 83, 84, 85	-0.387	-0.2163	-0.45761	-0.24955	0.92814283	-0.38231
		170238.8	13	227.4828	14.814792	24	
Route_0166	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 44, 48, 52, 57, 68, 74, 85	-0.43693	-0.92302	1.525291	-0.097286	-0.4449087	-0.37685
		169629.1	10	296.5411	15.305838	16	
Route_0539	1, 3, 6, 16, 25, 24, 30, 41, 47, 51, 56, 67, 72, 73, 79, 84, 85	-0.49505	-0.45187	0.423578	0.082838	0.06998564	-0.37051
		168919.5	12	258.1718	15.886732	19	
Route_0602	1, 3, 7, 14, 23, 30, 34, 40, 46, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	2.219937	0.490424	-1.69412	-1.284709	-0.1016458	-0.37011
		202068.8	16	184.419	11.476444	18	
Route_0454	1, 3, 6, 8, 15, 24, 30, 41, 46, 54, 61, 66, 77, 81, 83, 84, 85	0.495795	0.254851	-0.41096	-0.577381	-0.1016458	-0.33934
		181017.4	15	229.1074	13.757551	18	
Route_0540	1, 3, 6, 16, 25, 24, 30, 41, 47, 51, 56, 67, 72, 78, 83, 84, 85	-0.5097	0.254851	-0.1263	-1.040479	1.09977427	-0.32186
		168740.6	15	239.0211	12.264075	25	
Route_0658	1, 3, 7, 15, 24, 30, 35, 42, 51, 55, 62, 67, 71, 77, 81, 83, 84, 85	0.301035	0.254851	-1.10021	-0.636975	0.92814283	-0.25315
		178639.5	15	205.1031	13.56536	24	
Route_0077	1, 2, 5, 9, 17, 27, 33, 44, 49, 53, 60, 70, 80, 82, 85	-0.33416	0.019277	-0.27444	0.274183	0.06998564	-0.24515
		170883.9	14	233.8621	16.503812	19	
Route_0700	1, 3, 7, 15, 31, 35, 41, 46, 54, 61, 66, 77, 81, 83, 84, 85	0.600657	0.254851	-1.18444	0.8924857	-0.7881716	-0.22462
		182297.8	15	202.1694	18.497815	14	
Route_0248	1, 2, 5, 10, 11, 13, 21, 28, 33, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	0.289384	1.668292	-1.36813	-0.022136	-0.7881716	-0.22076
		178497.2	21	195.7722	15.548195	14	
Route_0305	1, 2, 5, 10, 12, 19, 33, 37, 45, 50, 60, 70, 80, 82, 85	-0.20415	0.961571	-0.09983	-0.593409	-0.2732772	-0.2091
		172471.3	18	239.943	13.70586	17	
Route_0603	1, 3, 7, 14, 23, 30, 34, 40, 46, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	1.318223	0.725998	-1.26389	-1.057846	0.06998564	-0.20753
		191059.1	17	199.4026	12.208067	19	
Route_0264	1, 2, 5, 10, 11, 13, 21, 29, 39, 50, 60, 69, 76, 80, 82, 85	-0.41947	0.961571	0.338008	0.044099	-1.1314344	-0.20722
		169842.3	18	255.1916	15.7618	12	
Route_0446	1, 3, 6, 8, 15, 24, 30, 35, 42, 56, 62, 61, 65, 81, 83, 84, 85	0.897965	0.019277	-1.02443	-0.851832	0.75651139	-0.20251
		185927.8	14	207.7421	12.872455	23	
Route_0047	1, 2, 4, 13, 21, 28, 33, 44, 49, 53, 60, 70, 80, 82, 85	0.333973	0.019277	-0.13685	-0.117183	-0.2732772	-0.17406
		179041.6	14	238.6538	15.241671	17	
Route_0439	1, 3, 6, 8, 15, 24, 30, 34, 40, 54, 61, 66, 77, 81, 83, 84, 85	0.596685	0.254851	-0.51355	-0.736691	0.24161707	-0.15709
		182249.3	15	225.5346	13.243781	20	
Route_0242	1, 2, 5, 10, 11, 13, 21, 28, 33, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	0.723512	0.490424	0.526003	-0.584527	-1.3030659	-0.14765
		183797.8	16	261.7389	13.734505	11	

Appendix B
Z-Score Analysis
Route Data with Z-Score
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Schedule JD-D1

Route_0192	1, 2, 5, 9, 18, 20, 21, 28, 33, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	0.312773	0.725998	0.405894	-0.788734	-0.7881716	-0.13224
		178782.8	17	257.5559	13.075944	14	
Route_0180	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 43, 52, 58, 64, 76, 80, 82, 85	-0.2097	0.254851	0.303102	-0.015513	-0.4449087	-0.11217
		172403.5	15	253.976	15.569553	16	
Route_0241	1, 2, 5, 10, 11, 13, 21, 28, 33, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	0.61	-0.2163	1.163564	-0.193632	-1.4746973	-0.11106
		182411.8	13	283.9432	14.995127	10	
Route_0191	1, 2, 5, 9, 18, 20, 21, 28, 33, 37, 45, 50, 53, 59, 63, 68, 74, 85	0.19926	0.019277	1.043455	-0.397839	-0.959803	-0.09565
		177396.8	14	279.7602	14.336566	13	
Route_0329	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 44, 48, 52, 58, 63, 68, 75, 82, 85	-0.43909	0.254851	0.81382	-0.449543	-0.2732772	-0.09324
		169602.8	15	271.7627	14.169824	17	
Route_0608	1, 3, 7, 14, 23, 30, 34, 40, 46, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	0.840827	0.254851	-1.10983	-0.659414	0.58487995	-0.08869
		185230.2	15	204.7679	13.492996	22	
Route_0145	1, 2, 5, 9, 18, 19, 33, 37, 45, 50, 60, 70, 80, 82, 85	-0.07475	0.961571	0.078667	-0.600935	-0.4449087	-0.08036
		174051.2	18	246.1596	13.681588	16	
Route_0205	1, 2, 5, 9, 18, 20, 21, 28, 33, 44, 49, 59, 64, 76, 80, 82, 85	-0.18872	0.725998	-0.5582	0.0458594	-0.1016458	-0.07671
		172659.7	17	223.9794	15.767477	18	
Route_0298	1, 2, 5, 10, 12, 19, 33, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	0.091395	0.961571	-0.45411	-0.058196	-0.6165401	-0.07588
		176079.8	18	227.6045	15.431903	15	
Route_0327	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 44, 48, 52, 57, 68, 75, 82, 85	-0.45282	0.254851	0.7088	-0.480651	-0.1016458	-0.07146
		169435.2	15	268.1052	14.069501	18	
Route_0423	1, 3, 6, 8, 14, 23, 30, 41, 47, 55, 62, 67, 72, 73, 79, 84, 85	-0.53335	-0.68744	-0.16551	0.0523267	1.27140571	-0.06257
		168451.8	11	237.6557	15.788334	26	
Route_0328	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 44, 48, 52, 58, 63, 68, 74, 85	-0.5526	-0.45187	1.451381	-0.058648	-0.4449087	-0.05665
		168216.8	12	293.967	15.430446	16	
Route_0447	1, 3, 6, 8, 15, 24, 30, 35, 42, 56, 62, 66, 77, 81, 83, 84, 85	-0.00375	0.254851	-0.5942	-0.62497	0.92814283	-0.03993
		174918.1	15	222.7256	13.604078	24	
Route_0326	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 44, 48, 52, 57, 68, 74, 85	-0.56633	-0.45187	1.346361	-0.089756	-0.2732772	-0.03487
		168049.2	12	290.3095	15.330123	17	
Route_0644	1, 3, 7, 15, 24, 30, 34, 40, 46, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	0.942378	0.254851	-0.73697	-0.389304	-0.1016458	-0.03069
		186470.1	15	217.7536	14.364091	18	
Route_0230	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 44, 49, 59, 64, 76, 80, 82, 85	-0.14742	0.961571	-0.78129	0.5596753	-0.6165401	-0.024
		173163.9	18	216.21	17.424514	15	
Route_0424	1, 3, 6, 8, 14, 23, 30, 41, 47, 55, 62, 67, 72, 78, 83, 84, 85	-0.548	0.019277	-0.71539	-1.070991	2.30119434	-0.01392
		168272.9	14	218.505	12.165677	32	
Route_0008	1, 2, 4, 13, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	0.49489	0.961571	-0.95784	0.4480401	-0.959803	-0.01314
		181006.4	18	210.0612	17.064495	13	
Route_0273	1, 2, 5, 10, 12, 19, 27, 32, 36, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	-0.27804	1.432718	-0.79629	0.2469821	-0.6165401	-0.01117
		171569.1	20	215.6876	16.41609	15	
Route_0459	1, 3, 6, 8, 15, 24, 30, 41, 47, 51, 56, 67, 72, 73, 79, 84, 85	-0.4318	-0.68744	0.207211	0.3224709	0.58487995	-0.00468
		169691.7	11	250.6364	16.659539	22	
Route_0185	1, 2, 5, 9, 18, 20, 21, 28, 33, 36, 43, 52, 58, 64, 76, 80, 82, 85	-0.20123	0.725998	0.146511	-0.380836	-0.2732772	0.017167
		172507	17	248.5224	14.3914	17	
Route_0090	1, 2, 5, 9, 17, 32, 36, 37, 45, 50, 60, 70, 80, 82, 85	-0.11793	0.490424	0.205907	-0.100108	-0.4449087	0.033389
		173524.1	16	250.591	15.296737	16	
Route_0460	1, 3, 6, 8, 15, 24, 30, 41, 47, 51, 56, 67, 72, 78, 83, 84, 85	-0.44645	0.019277	-0.34267	-0.800846	1.61466858	0.043974
		169512.8	14	231.4857	13.036883	28	
Route_0138	1, 2, 5, 9, 18, 19, 33, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	0.220792	0.961571	-0.27561	-0.065722	-0.7881716	0.052854
		177659.7	18	233.8211	15.407631	14	
Route_0002	1, 2, 4, 13, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	0.929019	-0.2163	0.93629	-0.114351	-1.4746973	0.059964
		186307	13	276.028	15.250804	10	
Route_0267	1, 2, 5, 10, 12, 19, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	0.156085	0.254851	1.097841	-0.315409	-1.1314344	0.061933
		176869.7	15	281.6543	14.6024	12	
Route_0174	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 44, 49, 59, 63, 68, 75, 82, 85	-0.12403	0.019277	0.992734	-0.206923	-0.6165401	0.064515
		173449.5	14	277.9937	14.952263	15	
Route_0097	1, 2, 5, 9, 17, 32, 36, 44, 49, 53, 60, 70, 80, 82, 85	-0.35274	0.019277	0.32942	0.1794906	-0.1016458	0.073807
		170657.1	14	254.8926	16.198433	18	
Route_0543	1, 3, 6, 16, 25, 24, 30, 41, 47, 55, 62, 67, 72, 73, 79, 84, 85	-0.58919	-0.45187	0.441051	0.1058506	0.58487995	0.09072
		167770	12	258.7803	15.960947	22	
Route_0001	1, 2, 4, 13, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	0.815506	-0.92302	1.573851	0.276544	-1.6463288	0.096555
		184921	10	298.2322	16.511427	9	
Route_0266	1, 2, 5, 10, 12, 19, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	0.042572	-0.45187	1.735402	0.075486	-1.3030659	0.098525
		175483.7	12	303.8586	15.863022	11	
Route_0173	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 44, 49, 59, 63, 68, 74, 85	-0.23755	-0.68744	1.630295	0.1839721	-0.7881716	0.101107
		172063.5	11	300.198	16.212885	14	
Route_0705	1, 3, 7, 15, 31, 35, 41, 47, 51, 56, 67, 72, 73, 79, 84, 85	-0.32694	-0.68744	-0.56627	1.7923374	-0.1016458	0.110038
		170972.1	11	223.6984	21.399804	18	
Route_0113	1, 2, 5, 9, 18, 19, 27, 32, 36, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	-0.14865	1.432718	-0.61779	0.2394557	-0.7881716	0.117565
		173149	20	221.9042	16.391818	14	
Route_0544	1, 3, 6, 16, 25, 24, 30, 41, 47, 55, 62, 67, 72, 78, 83, 84, 85	-0.60385	0.254851	-0.10883	-1.017467	1.61466858	0.139375
		167591.1	15	239.6296	12.33829	28	
Route_0642	1, 3, 7, 15, 24, 30, 34, 40, 46, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	2.227342	0.490424	-1.30379	-0.991586	-0.2732772	0.14911
		202159.2	16	198.0128	12.421755	17	

Appendix B
Z-Score Analysis
Route Data with Z-Score
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Schedule JD-D1

Route_0706	1, 3, 7, 15, 31, 35, 41, 47, 51, 56, 67, 72, 78, 83, 84, 85	-0.34159	0.019277	-1.11615	0.6690201	0.92814283	0.158694
		170793.2	14	204.5477	17.777147	24	
Route_0083	1, 2, 5, 9, 17, 32, 36, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	0.177621	0.490424	-0.14838	0.4351051	-0.7881716	0.166603
		177132.6	16	238.2524	17.02278	14	
Route_0070	1, 2, 5, 9, 17, 27, 33, 37, 45, 50, 60, 70, 80, 82, 85	-0.09935	0.961571	-0.39897	-0.005321	-0.2732772	0.184652
		173750.9	18	229.525	15.602424	17	
Route_0107	1, 2, 5, 9, 18, 19, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	0.285482	0.254851	1.276341	-0.322935	-1.3030659	0.190672
		178449.6	15	287.8709	14.578127	11	
Route_0352	1, 2, 5, 10, 12, 20, 21, 28, 33, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	0.183376	1.197145	0.226963	-0.781204	-0.6165401	0.20974
		177202.9	19	251.3243	13.10023	15	
Route_0106	1, 2, 5, 9, 18, 19, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	0.171969	-0.45187	1.913902	0.0679596	-1.4746973	0.227263
		177063.6	12	310.0752	15.83875	10	
Route_0340	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 43, 52, 58, 64, 76, 80, 82, 85	-0.3391	0.725998	0.124171	-0.007983	-0.2732772	0.229808
		170823.6	17	247.7444	15.593839	17	
Route_0351	1, 2, 5, 10, 12, 20, 21, 28, 33, 37, 45, 50, 53, 59, 63, 68, 74, 85	0.069864	0.490424	0.864524	-0.390309	-0.7881716	0.246332
		175816.9	16	273.5286	14.360852	14	
Route_0575	1, 3, 6, 16, 25, 31, 35, 41, 47, 55, 66, 77, 81, 83, 84, 85	-0.67291	0.019277	-0.11575	1.4638827	-0.4449087	0.249587
		166747.9	14	239.3885	20.340549	16	
Route_0040	1, 2, 4, 13, 21, 28, 33, 37, 45, 50, 60, 70, 80, 82, 85	0.568783	0.961571	-0.26138	-0.396687	-0.6165401	0.255743
		181908.6	18	234.3167	14.340282	15	
Route_0210	1, 2, 5, 9, 18, 20, 21, 29, 39, 50, 60, 70, 80, 82, 85	0.304764	0.961571	1.185685	-1.571624	-0.6165401	0.263856
		178685	18	284.7136	10.551153	15	
Route_0365	1, 2, 5, 10, 12, 20, 21, 28, 33, 44, 49, 59, 64, 76, 80, 82, 85	-0.31812	1.197145	-0.73713	0.0533898	0.06998564	0.265268
		171079.8	19	217.7478	15.791763	19	
Route_0643	1, 3, 7, 15, 24, 30, 34, 40, 46, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	1.325628	0.725998	-0.87356	-0.764723	-0.1016458	0.311692
		191149.5	17	212.9964	13.153378	18	
Route_0409	1, 3, 6, 8, 14, 23, 30, 35, 42, 56, 67, 72, 73, 79, 84, 85	-0.44669	-0.68744	-0.18505	-0.150726	1.78630002	0.316394
		169509.9	11	236.9752	15.133498	29	
Route_0063	1, 2, 5, 9, 17, 27, 33, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	0.196195	0.961571	-0.75325	0.5298927	-0.6165401	0.317866
		177359.4	18	217.1864	17.328467	15	
Route_0590	1, 3, 7, 14, 22, 40, 46, 47, 51, 56, 67, 72, 73, 79, 84, 85	0.336992	-0.68744	-0.03826	-0.047005	0.75651139	0.320793
		179078.5	11	242.0873	15.467993	23	
Route_0345	1, 2, 5, 10, 12, 20, 21, 28, 33, 36, 43, 52, 58, 64, 76, 80, 82, 85	-0.33063	1.197145	-0.03242	-0.373306	-0.1016458	0.359148
		170927.1	19	242.2908	14.415686	18	
Route_0410	1, 3, 6, 8, 14, 23, 30, 35, 42, 56, 67, 72, 78, 83, 84, 85	-0.46134	0.019277	-0.73493	-1.274043	2.81608866	0.365049
		169331	14	217.8245	11.510841	35	
Route_0591	1, 3, 7, 14, 22, 40, 46, 47, 51, 56, 67, 72, 78, 83, 84, 85	0.322338	0.019277	-0.58814	-1.170322	1.78630002	0.369449
		178899.6	14	222.9366	11.845336	29	
Route_0560	1, 3, 6, 16, 25, 31, 35, 34, 40, 54, 65, 81, 83, 84, 85	0.322231	-0.2163	-0.19117	0.9147257	-0.4449087	0.384582
		178898.3	13	236.762	18.569539	16	
Route_0033	1, 2, 4, 13, 21, 28, 33, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	0.864329	0.961571	-0.61567	0.1385265	-0.959803	0.388957
		185517.1	18	221.9781	16.066325	13	
Route_0334	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 44, 49, 59, 63, 68, 75, 82, 85	-0.25343	0.490424	0.813803	-0.199393	-0.4449087	0.406497
		171869.6	16	271.7621	14.976549	16	
Route_0648	1, 3, 7, 15, 24, 30, 34, 40, 46, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	0.848232	0.254851	-0.71951	-0.366291	0.41324851	0.430534
		185320.6	15	218.3617	14.438306	21	
Route_0333	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 44, 49, 59, 63, 68, 74, 85	-0.36694	-0.2163	1.451364	0.1915025	-0.6165401	0.443088
		170483.6	13	293.9664	16.237171	15	
Route_0619	1, 3, 7, 14, 23, 30, 35, 42, 51, 55, 62, 67, 72, 73, 79, 84, 85	0.241345	-0.2163	-0.82777	-0.538117	1.78630002	0.445462
		177910.7	13	214.5912	13.884176	29	
Route_0463	1, 3, 6, 8, 15, 24, 30, 41, 47, 55, 62, 67, 72, 73, 79, 84, 85	-0.52595	-0.68744	0.224684	0.3454835	1.09977427	0.456553
		168542.2	11	251.2449	16.733754	25	
Route_0529	1, 3, 6, 16, 25, 24, 30, 35, 42, 56, 67, 72, 73, 79, 84, 85	-0.50253	-0.45187	0.421512	-0.097202	1.09977427	0.469685
		168828.1	12	258.0998	15.306111	25	
Route_0311	1, 2, 5, 10, 12, 19, 33, 44, 49, 53, 60, 69, 76, 80, 82, 85	-0.83201	0.254851	0.003974	1.1534634	-0.1016458	0.478636
		164805.3	15	243.5583	19.339459	18	
Route_0405	1, 3, 6, 8, 14, 23, 30, 35, 42, 51, 55, 66, 77, 81, 83, 84, 85	0.052764	0.254851	-0.61094	-0.65001	1.44303715	0.489697
		175608.1	15	222.1426	13.523323	27	
Route_0620	1, 3, 7, 14, 23, 30, 35, 42, 51, 55, 62, 67, 72, 78, 83, 84, 85	0.226691	0.490424	-1.37765	-1.661434	2.81608866	0.494117
		177731.7	16	195.4405	10.261519	35	
Route_0464	1, 3, 6, 8, 15, 24, 30, 41, 47, 55, 62, 67, 72, 78, 83, 84, 85	-0.5406	0.019277	-0.3252	-0.777834	2.1295629	0.505208
		168363.3	14	232.0942	13.111097	31	
Route_0530	1, 3, 6, 16, 25, 24, 30, 35, 42, 56, 67, 72, 78, 83, 84, 85	-0.51718	0.254851	-0.12837	-1.220519	2.1295629	0.51834
		168649.2	15	238.9491	11.683454	31	
Route_0571	1, 3, 6, 16, 25, 31, 35, 41, 47, 55, 61, 65, 81, 83, 84, 85	0.228804	0.254851	-0.54597	1.2370264	-0.6165401	0.558172
		177757.5	15	224.4055	19.608946	15	
Route_0709	1, 3, 7, 15, 31, 35, 41, 47, 55, 62, 67, 72, 73, 79, 84, 85	-0.42108	-0.68744	-0.5488	1.81535	0.41324851	0.571272
		169822.6	11	224.3069	21.474018	21	
Route_0370	1, 2, 5, 10, 12, 20, 21, 29, 39, 50, 60, 70, 80, 82, 85	0.175367	1.432718	1.006754	-1.564094	-0.4449087	0.605837
		177105.1	20	278.482	10.575439	16	
Route_0151	1, 2, 5, 9, 18, 19, 33, 44, 49, 53, 60, 69, 76, 80, 82, 85	-0.70261	0.254851	0.182473	1.145937	-0.2732772	0.607375
		166385.2	15	249.7749	19.315187	17	

Appendix B
Z-Score Analysis
Route Data with Z-Score
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Route_0495	1, 3, 6, 8, 15, 31, 35, 41, 47, 55, 66, 77, 81, 83, 84, 85	-0.60966	-0.2163	-0.3321	1.7034904	0.06998564	0.61541
		167520.1	13	231.8537	21.113275	19	
Route_0710	1, 3, 7, 15, 31, 35, 41, 47, 55, 62, 67, 72, 78, 83, 84, 85	-0.43574	0.019277	-1.09868	0.6920327	1.44303715	0.619928
		169643.7	14	205.1562	17.851362	27	
Route_0525	1, 3, 6, 16, 25, 24, 30, 35, 42, 51, 55, 66, 77, 81, 83, 84, 85	-0.00308	0.490424	-0.00438	-0.596486	0.75651139	0.642988
		174926.3	16	243.2672	13.695936	23	
Route_0605	1, 3, 7, 14, 23, 30, 34, 40, 46, 47, 51, 56, 67, 72, 73, 79, 84, 85	0.882687	-0.2163	-0.46454	-0.290445	0.75651139	0.667917
		185741.3	13	227.2414	14.682907	23	
Route_0565	1, 3, 6, 16, 25, 31, 35, 41, 46, 54, 65, 81, 83, 84, 85	0.22134	0.254851	-0.08861	1.0740105	-0.7881716	0.673418
		177666.4	15	240.3338	19.083226	14	
Route_0606	1, 3, 7, 14, 23, 30, 34, 40, 46, 47, 51, 56, 67, 72, 78, 83, 84, 85	0.868034	0.490424	-1.01442	-1.413763	1.78630002	0.716572
		185562.4	16	208.0907	11.060251	29	
Route_0583	1, 3, 6, 16, 25, 31, 42, 56, 67, 71, 77, 81, 83, 84, 85	-1.12296	-0.45187	0.218212	1.6746151	0.41324851	0.731243
		161252.8	12	251.0195	21.020154	21	
Route_0480	1, 3, 6, 8, 15, 31, 35, 34, 40, 54, 65, 81, 83, 84, 85	0.385476	-0.45187	-0.40752	1.1543334	0.06998564	0.750405
		179670.5	12	229.2272	19.342265	19	
Route_0381	1, 3, 6, 8, 14, 22, 40, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	0.581372	-0.2163	-0.04722	-0.310293	0.75651139	0.76407
		182062.3	13	241.7752	14.618899	23	
Route_0594	1, 3, 7, 14, 22, 40, 46, 47, 55, 62, 67, 72, 73, 79, 84, 85	0.242847	-0.68744	-0.02079	-0.023992	1.27140571	0.782027
		177929	11	242.6959	15.542208	26	
Route_0257	1, 2, 5, 10, 11, 13, 21, 28, 33, 44, 49, 53, 60, 70, 80, 82, 85	0.500952	0.725998	0.057746	-0.221993	-0.2732772	0.789425
		181080.4	17	245.431	14.903664	17	
Route_0401	1, 3, 6, 8, 14, 23, 30, 35, 42, 51, 55, 61, 65, 81, 83, 84, 85	0.954478	0.490424	-1.04116	-0.876867	1.27140571	0.798282
		186617.8	16	207.1595	12.79172	26	
Route_0380	1, 3, 6, 8, 14, 22, 40, 46, 47, 55, 66, 77, 81, 83, 84, 85	0.054266	-0.2163	0.196036	-0.135886	0.92814283	0.826263
		175626.5	13	250.2472	15.181355	24	
Route_0170	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 44, 48, 52, 58, 64, 76, 80, 82, 85	-0.0019	0.725998	0.045583	0.1611382	-0.1016458	0.829177
		174940.8	17	245.0074	16.139247	18	
Route_0595	1, 3, 7, 14, 22, 40, 46, 47, 55, 62, 67, 72, 78, 83, 84, 85	0.228193	0.019277	-0.57067	-1.14731	2.30119434	0.830682
		177750.1	14	223.5451	11.919551	32	
Route_0449	1, 3, 6, 8, 15, 24, 30, 35, 42, 56, 67, 72, 73, 79, 84, 85	-0.43928	-0.68744	0.205145	0.1424313	1.61466858	0.835518
		169600.4	11	250.5645	16.078918	28	
Route_0076	1, 2, 5, 9, 17, 27, 33, 44, 49, 53, 60, 69, 76, 80, 82, 85	-0.72721	0.254851	-0.29516	1.7415518	-0.1016458	0.872387
		166084.9	15	233.1402	21.236022	18	
Route_0450	1, 3, 6, 8, 15, 24, 30, 35, 42, 56, 67, 72, 78, 83, 84, 85	-0.45394	0.019277	-0.34474	-0.980886	2.64445722	0.884173
		169421.4	14	231.4138	12.456261	34	
Route_0304	1, 2, 5, 10, 12, 19, 33, 37, 45, 50, 60, 69, 76, 80, 82, 85	-0.5972	1.197145	-0.12056	0.8739598	-0.4449087	0.90844
		167672.3	19	239.2212	18.43807	16	
Route_0581	1, 3, 6, 16, 25, 31, 42, 56, 62, 61, 65, 81, 83, 84, 85	0.162002	-0.2163	-0.34861	1.0723333	0.24161707	0.911042
		176941.9	13	231.2787	19.077817	20	
Route_0491	1, 3, 6, 8, 15, 31, 35, 41, 47, 55, 61, 65, 81, 83, 84, 85	0.29205	0.019277	-0.76232	1.4766341	-0.1016458	0.923994
		178529.8	14	216.8706	20.381672	18	
Route_0411	1, 3, 6, 8, 14, 23, 30, 41, 46, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.026177	0.254851	-0.37091	-0.394424	0.41324851	0.928946
		187493.3	15	230.5024	14.347581	21	
Route_0046	1, 2, 4, 13, 21, 28, 33, 44, 49, 53, 60, 69, 76, 80, 82, 85	-0.05907	0.254851	-0.15758	1.3501856	-0.4449087	0.943477
		174242.7	15	237.9319	19.973881	16	
Route_0218	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	0.661869	1.668292	-0.76324	0.3432306	-0.959803	0.950344
		183045.2	21	216.8385	16.726488	13	
Route_0521	1, 3, 6, 16, 25, 24, 30, 35, 42, 51, 55, 61, 65, 81, 83, 84, 85	0.898637	0.725998	-0.4346	-0.823343	0.58487995	0.951572
		185936	17	228.2841	12.964333	22	
Route_0659	1, 3, 7, 15, 24, 30, 35, 42, 51, 55, 62, 67, 72, 73, 79, 84, 85	0.248749	-0.2163	-0.43744	-0.244994	1.61466858	0.964683
		178001.1	13	228.185	14.829487	28	
Route_0445	1, 3, 6, 8, 15, 24, 30, 35, 42, 51, 55, 66, 77, 81, 83, 84, 85	0.060169	0.254851	-0.22075	-0.356853	1.27140571	1.008821
		175698.6	15	235.7318	14.468743	26	
Route_0660	1, 3, 7, 15, 24, 30, 35, 42, 51, 55, 62, 67, 72, 78, 83, 84, 85	0.234096	0.490424	-0.98733	-1.368311	2.64445722	1.013338
		177822.2	16	209.0343	11.20683	34	
Route_0212	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	1.095997	0.490424	1.130887	-0.219161	-1.4746973	1.023451
		188345.7	16	282.8052	14.912798	10	
Route_0144	1, 2, 5, 9, 18, 19, 33, 37, 45, 50, 60, 69, 76, 80, 82, 85	-0.4678	1.197145	0.05794	0.8664334	-0.6165401	1.037179
		169252.2	19	245.4378	18.413798	15	
Route_0162	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	0.685258	0.725998	1.010779	-0.423368	-0.959803	1.038863
		183330.7	17	278.6222	14.254237	13	
Route_0485	1, 3, 6, 8, 15, 31, 35, 41, 46, 54, 65, 81, 83, 84, 85	0.284586	0.019277	-0.30496	1.3136182	-0.2732772	1.039241
		178438.6	14	232.799	19.855952	17	
Route_0211	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	0.982484	-0.2163	1.768448	0.1717345	-1.6463288	1.060042
		186959.8	13	305.0095	16.17342	9	
Route_0582	1, 3, 6, 16, 25, 31, 42, 56, 62, 66, 77, 81, 83, 84, 85	-0.73971	0.019277	0.081615	1.2991957	0.41324851	1.073625
		165932.2	14	246.2623	19.80944	21	
Route_0161	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 74, 85	0.571745	0.019277	1.648339	-0.032473	-1.1314344	1.075454
		181944.8	14	300.8264	15.514859	12	
Route_0531	1, 3, 6, 16, 25, 24, 30, 41, 46, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	0.970336	0.490424	0.235653	-0.3409	-0.2732772	1.082236
		186811.5	16	251.627	14.520194	17	

Appendix B
Z-Score Analysis
Route Data with Z-Score
Montgomery - Callaway Connector Project

Schedule JD-D1

Route_0503	1, 3, 6, 8, 15, 31, 42, 56, 67, 71, 77, 81, 83, 84, 85	-1.05972	-0.68744	0.00186	1.9142228	0.92814283	1.097066
		162025.1	11	243.4847	21.79288	24	
Route_0396	1, 3, 6, 8, 14, 23, 30, 34, 40, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.127067	0.254851	-0.4735	-0.553734	0.75651139	1.111199
		188725.1	15	226.9295	13.833811	23	
Route_0609	1, 3, 7, 14, 23, 30, 34, 40, 46, 47, 55, 62, 67, 72, 73, 79, 84, 85	0.788542	-0.2163	-0.44707	-0.267433	1.27140571	1.129151
		184591.8	13	227.8499	14.757122	26	
Route_0376	1, 3, 6, 8, 14, 22, 40, 46, 47, 55, 61, 65, 81, 83, 84, 85	0.95598	0.019277	-0.23418	-0.362742	0.75651139	1.134847
		186636.2	14	235.2641	14.449752	23	
Route_0089	1, 2, 5, 9, 17, 32, 36, 37, 45, 50, 60, 69, 76, 80, 82, 85	-0.51097	0.725998	0.18518	1.3672606	-0.6165401	1.150928
		168725.1	17	249.8691	20.028947	15	
Route_0330	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 44, 48, 52, 58, 64, 76, 80, 82, 85	-0.13129	1.197145	-0.13335	0.1686686	0.06998564	1.171159
		173360.9	19	238.7758	16.163532	19	
Route_0395	1, 3, 6, 8, 14, 23, 30, 34, 40, 46, 47, 55, 66, 77, 81, 83, 84, 85	0.599961	0.254851	-0.23024	-0.379326	0.92814283	1.173387
		182289.3	15	235.4013	14.396269	24	
Route_0610	1, 3, 7, 14, 23, 30, 34, 40, 46, 47, 55, 62, 67, 72, 78, 83, 84, 85	0.773888	0.490424	-0.99695	-1.39075	2.30119434	1.177806
		184412.9	16	208.6992	11.134465	32	
Route_0645	1, 3, 7, 15, 24, 30, 34, 40, 46, 47, 51, 56, 67, 72, 73, 79, 84, 85	0.890092	-0.2163	-0.07422	0.0026776	0.58487995	1.187138
		185831.7	13	240.8352	15.628218	22	
Route_0096	1, 2, 5, 9, 17, 32, 36, 44, 49, 53, 60, 69, 76, 80, 82, 85	-0.74578	0.254851	0.308694	1.6468594	-0.2732772	1.191346
		165858.1	15	254.1707	20.930642	17	
Route_0250	1, 2, 5, 10, 11, 13, 21, 28, 33, 37, 45, 50, 60, 70, 80, 82, 85	0.735761	1.668292	-0.06679	-0.501496	-0.6165401	1.21923
		183947.4	21	241.0939	14.002275	15	
Route_0713	1, 3, 7, 15, 31, 42, 51, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.37168	-0.2163	-0.64074	1.5267978	0.92814283	1.226221
		170425.8	13	221.1049	20.543448	24	
Route_0646	1, 3, 7, 15, 24, 30, 34, 40, 46, 47, 51, 56, 67, 72, 78, 83, 84, 85	0.875439	0.490424	-0.6241	-1.12064	1.61466858	1.235794
		185652.8	16	221.6845	12.005561	28	
Route_0516	1, 3, 6, 16, 25, 24, 30, 34, 40, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.071227	0.490424	0.133064	-0.50021	0.06998564	1.26449
		188043.3	16	248.0541	14.006424	19	
Route_0692	1, 3, 7, 15, 31, 35, 34, 40, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.239334	-0.2163	-0.85675	1.209315	-0.1016458	1.273952
		190095.9	13	213.5818	19.519578	18	
Route_0501	1, 3, 6, 8, 15, 31, 42, 56, 62, 61, 65, 81, 83, 84, 85	0.225248	-0.45187	-0.56497	1.311941	0.75651139	1.276865
		177714.1	12	223.7439	19.850543	23	
Route_0069	1, 2, 5, 9, 17, 27, 33, 37, 45, 50, 60, 69, 76, 80, 82, 85	-0.4924	1.197145	-0.4197	1.4620482	-0.4449087	1.302191
		168951.9	19	228.8031	20.334633	16	
Route_0441	1, 3, 6, 8, 15, 24, 30, 35, 42, 51, 55, 61, 65, 81, 83, 84, 85	0.961883	0.490424	-0.65097	-0.58371	1.09977427	1.317405
		186708.2	16	220.7487	13.73714	25	
Route_0515	1, 3, 6, 16, 25, 24, 30, 34, 40, 46, 47, 55, 66, 77, 81, 83, 84, 85	0.54412	0.490424	0.376318	-0.325802	0.24161707	1.326677
		181607.5	16	256.5259	14.568882	20	
Route_0691	1, 3, 7, 15, 31, 35, 34, 40, 46, 47, 55, 66, 77, 81, 83, 84, 85	0.712228	-0.2163	-0.6135	1.3837226	0.06998564	1.33614
		183660	13	222.0536	20.082036	19	
Route_0243	1, 2, 5, 10, 11, 13, 21, 28, 33, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	1.031307	1.668292	-0.42107	0.033717	-0.959803	1.352444
		187555.9	21	228.7554	15.728318	13	
Route_0300	1, 2, 5, 10, 12, 19, 33, 37, 38, 39, 50, 60, 70, 80, 82, 85	0.537772	0.961571	0.847227	-0.537556	-0.4449087	1.364105
		181530	18	272.9262	13.885984	16	
Route_0193	1, 2, 5, 9, 18, 20, 21, 28, 33, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	0.620568	1.903865	-0.54118	-0.17049	-0.4449087	1.367857
		182540.9	22	224.5724	15.069758	16	
Route_0039	1, 2, 4, 13, 21, 28, 33, 37, 45, 50, 60, 69, 76, 80, 82, 85	0.175738	1.197145	-0.28211	1.070682	-0.7881716	1.373282
		177109.6	19	233.5948	19.072492	14	
Route_0322	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 75, 82, 85	0.555861	1.197145	0.831848	-0.415837	-0.7881716	1.380844
		181750.8	19	272.3906	14.278523	14	
Route_0209	1, 2, 5, 9, 18, 20, 21, 29, 39, 50, 60, 69, 76, 80, 82, 85	-0.08828	1.197145	1.164958	-0.104255	-0.7881716	1.381395
		173886	19	283.9918	15.283363	14	
Route_0321	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 63, 68, 74, 85	0.442348	0.490424	1.469409	-0.024942	-0.959803	1.417436
		180364.9	16	294.5948	15.539145	13	
Route_0010	1, 2, 4, 13, 21, 28, 27, 32, 36, 37, 45, 50, 60, 70, 80, 82, 85	0.941268	0.961571	0.3435	-0.03132	-0.7881716	1.426847
		186456.5	18	255.3829	15.518575	14	
Route_0275	1, 2, 5, 10, 12, 19, 27, 32, 36, 37, 45, 50, 60, 70, 80, 82, 85	0.168334	1.432718	0.505052	-0.232378	-0.4449087	1.428817
		177019.2	20	261.0093	14.870171	16	
Route_0502	1, 3, 6, 8, 15, 31, 42, 56, 62, 66, 77, 81, 83, 84, 85	-0.67647	-0.2163	-0.13474	1.5388034	0.92814283	1.439448
		166704.4	13	238.7274	20.582166	24	
Route_0187	1, 2, 5, 9, 18, 20, 21, 28, 33, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	1.054696	0.725998	1.352954	-0.732881	-0.959803	1.440963
		187841.5	17	290.5391	13.256067	13	
Route_0451	1, 3, 6, 8, 15, 24, 30, 41, 46, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.033582	0.254851	0.019286	-0.101267	0.24161707	1.448069
		187583.7	15	244.0916	15.293001	20	
Route_0017	1, 2, 4, 13, 21, 28, 27, 32, 36, 44, 49, 53, 60, 70, 80, 82, 85	0.706458	0.490424	0.467014	0.2482784	-0.4449087	1.467265
		183589.6	16	259.6845	16.420271	16	
Route_0282	1, 2, 5, 10, 12, 19, 27, 32, 36, 44, 49, 53, 60, 70, 80, 82, 85	-0.06648	0.961571	0.628565	0.0472203	-0.1016458	1.469235
		174152.3	18	265.3109	15.771866	18	
Route_0186	1, 2, 5, 9, 18, 20, 21, 28, 33, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	0.941183	0.019277	1.990515	-0.341986	-1.1314344	1.477554
		186455.5	14	312.7433	14.51669	12	
Route_0391	1, 3, 6, 8, 14, 23, 30, 34, 40, 46, 47, 55, 61, 65, 81, 83, 84, 85	1.501675	0.490424	-0.66046	-0.606183	0.75651139	1.481971
		193299	16	220.4182	13.664666	23	

Appendix B
Z-Score Analysis
Route Data with Z-Score
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Schedule JD-D1

Route_0140	1, 2, 5, 9, 18, 19, 33, 37, 38, 39, 50, 60, 70, 80, 82, 85	0.667169	0.961571	1.025726	-0.545083	-0.6165401	1.492844
		183109.9	18	279.1428	13.861711	15	
Route_0115	1, 2, 5, 9, 18, 19, 27, 32, 36, 37, 45, 50, 60, 70, 80, 82, 85	0.29773	1.432718	0.683551	-0.239905	-0.6165401	1.557555
		178599.1	20	267.2259	14.845898	15	
Route_0003	1, 2, 4, 13, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	1.236813	0.961571	-0.01078	0.5038929	-1.1314344	1.560061
		190065.1	18	243.0444	17.244618	12	
Route_0268	1, 2, 5, 10, 12, 19, 27, 32, 36, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	0.46388	1.432718	0.15077	0.3028349	-0.7881716	1.562031
		180627.8	20	248.6707	16.596214	14	
Route_0697	1, 3, 7, 15, 31, 35, 41, 46, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.138444	0.254851	-0.7542	1.3685998	-0.4449087	1.562789
		188864	15	217.1536	20.033266	16	
Route_0175	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 44, 49, 59, 64, 76, 80, 82, 85	0.183762	1.197145	0.045663	0.4113209	-0.2732772	1.564613
		177207.6	19	245.0102	16.946077	17	
Route_0122	1, 2, 5, 9, 18, 19, 27, 32, 36, 44, 49, 53, 60, 70, 80, 82, 85	0.062921	0.961571	0.807065	0.039694	-0.2732772	1.597973
		175732.2	18	271.5275	15.747594	17	
Route_0085	1, 2, 5, 9, 17, 32, 36, 37, 38, 39, 50, 60, 70, 80, 82, 85	0.623998	0.490424	1.152966	-0.044255	-0.6165401	1.606593
		182582.8	16	283.5741	15.47686	15	
Route_0436	1, 3, 6, 8, 15, 24, 30, 34, 40, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.134472	0.254851	-0.0833	-0.260577	0.58487995	1.630323
		188815.5	15	240.5187	14.779231	22	
Route_0511	1, 3, 6, 16, 25, 24, 30, 34, 40, 46, 47, 55, 61, 65, 81, 83, 84, 85	1.445835	0.725998	-0.0539	-0.552659	0.06998564	1.635261
		192617.2	17	241.5428	13.837279	19	
Route_0687	1, 3, 7, 15, 31, 35, 34, 40, 46, 47, 55, 61, 65, 81, 83, 84, 85	1.613942	0.019277	-1.04372	1.1568663	-0.1016458	1.644724
		194669.7	14	207.0705	19.350433	18	
Route_0649	1, 3, 7, 15, 24, 30, 34, 40, 46, 47, 55, 62, 67, 72, 73, 79, 84, 85	0.795947	-0.2163	-0.05674	0.0256903	1.09977427	1.648372
		184682.2	13	241.4437	15.702433	25	
Route_0108	1, 2, 5, 9, 18, 19, 27, 32, 36, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	0.593276	1.432718	0.32927	0.2953085	-0.959803	1.69077
		182207.7	20	254.8873	16.571941	13	
Route_0435	1, 3, 6, 8, 15, 24, 30, 34, 40, 46, 47, 55, 66, 77, 81, 83, 84, 85	0.607366	0.254851	0.159951	-0.086169	0.75651139	1.69251
		182379.7	15	248.9905	15.341689	23	
Route_0650	1, 3, 7, 15, 24, 30, 34, 40, 46, 47, 55, 62, 67, 72, 78, 83, 84, 85	0.781293	0.490424	-0.60663	-1.097627	2.1295629	1.697027
		184503.3	16	222.293	12.079776	31	
Route_0353	1, 2, 5, 10, 12, 20, 21, 28, 33, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	0.491171	2.375012	-0.72011	-0.16296	-0.2732772	1.709838
		180961	24	218.3407	15.094044	17	
Route_0369	1, 2, 5, 10, 12, 20, 21, 29, 39, 50, 60, 69, 76, 80, 82, 85	-0.21768	1.668292	0.986028	-0.096725	-0.6165401	1.723376
		172306.1	21	277.7602	15.307648	15	
Route_0065	1, 2, 5, 9, 17, 27, 33, 37, 38, 39, 50, 60, 70, 80, 82, 85	0.642572	0.961571	0.548089	0.0505322	-0.4449087	1.757856
		182809.5	18	262.5081	15.782547	16	
Route_0347	1, 2, 5, 10, 12, 20, 21, 28, 33, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	0.925299	1.197145	1.174023	-0.725351	-0.7881716	1.782944
		186261.6	19	284.3075	13.280353	14	
Route_0346	1, 2, 5, 10, 12, 20, 21, 28, 33, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	0.811787	0.490424	1.811584	-0.334456	-0.959803	1.819536
		184875.6	16	306.5117	14.540975	13	
Route_0035	1, 2, 4, 13, 21, 28, 33, 37, 38, 39, 50, 60, 70, 80, 82, 85	1.310706	0.961571	0.685675	-0.340834	-0.7881716	1.828947
		190967.3	18	267.2998	14.520405	14	
Route_0335	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 44, 49, 59, 64, 76, 80, 82, 85	0.054365	1.668292	-0.13327	0.4188514	-0.1016458	1.906594
		175627.7	21	238.7786	16.970363	18	
Route_0256	1, 2, 5, 10, 11, 13, 21, 28, 33, 44, 49, 53, 60, 69, 76, 80, 82, 85	0.107906	0.961571	0.03702	1.2453761	-0.4449087	1.906964
		176281.4	18	244.7092	19.635874	16	
Route_0584	1, 3, 6, 16, 25, 31, 42, 56, 67, 72, 73, 79, 84, 85	-1.17525	-0.92302	0.880964	2.0665968	1.09977427	1.949071
		160614.4	10	274.1011	22.28428	25	
Route_0382	1, 3, 6, 8, 14, 22, 40, 54, 61, 62, 67, 72, 73, 79, 84, 85	0.529087	-0.68744	0.615539	0.0816887	1.44303715	1.981908
		181423.9	11	264.8572	15.883025	27	
Route_0585	1, 3, 6, 16, 25, 31, 42, 56, 67, 72, 78, 83, 84, 85	-1.1899	-0.2163	0.331081	0.9432795	2.1295629	1.997726
		160435.5	13	254.9504	18.661623	31	
Route_0431	1, 3, 6, 8, 15, 24, 30, 34, 40, 46, 47, 55, 61, 65, 81, 83, 84, 85	1.50908	0.490424	-0.27026	-0.313026	0.58487995	2.001094
		193389.4	16	234.0074	14.610086	22	
Route_0383	1, 3, 6, 8, 14, 22, 40, 54, 61, 62, 67, 72, 78, 83, 84, 85	0.514433	0.019277	0.065656	-1.041629	2.47282578	2.030563
		181245	14	245.7065	12.260369	33	
Route_0568	1, 3, 6, 16, 25, 31, 35, 41, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	-0.04098	0.490424	0.29703	1.9169863	-0.6165401	2.046923
		174463.6	16	253.7645	21.801792	15	
Route_0580	1, 3, 6, 16, 25, 31, 42, 51, 55, 66, 77, 81, 83, 84, 85	-0.67579	0.019277	0.455068	1.5673121	0.75651139	2.122374
		166712.6	14	259.2685	20.674106	23	
Route_0412	1, 3, 6, 8, 14, 23, 30, 41, 46, 54, 61, 62, 67, 72, 73, 79, 84, 85	0.973891	-0.2163	0.291856	-0.002442	1.09977427	2.146784
		186854.9	13	253.5843	15.611707	25	
Route_0413	1, 3, 6, 8, 14, 23, 30, 41, 46, 54, 61, 62, 67, 72, 78, 83, 84, 85	0.959238	0.490424	-0.25803	-1.125759	2.1295629	2.195439
		186675.9	16	234.4336	11.989051	31	
Route_0566	1, 3, 6, 16, 25, 31, 35, 41, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	1.243987	0.725998	-0.2698	1.3147045	-0.7881716	2.226722
		190152.7	17	234.0238	19.859455	14	
Route_0532	1, 3, 6, 16, 25, 24, 30, 41, 46, 54, 61, 62, 67, 72, 73, 79, 84, 85	0.918051	0.019277	0.898416	0.0510821	0.41324851	2.300074
		186173.1	14	274.7089	15.78432	21	
Route_0504	1, 3, 6, 8, 15, 31, 42, 56, 67, 72, 73, 79, 84, 85	-1.112	-1.15859	0.664613	2.3062045	1.61466858	2.314894
		161386.7	9	266.5663	23.057006	28	
Route_0397	1, 3, 6, 8, 14, 23, 30, 34, 40, 54, 61, 62, 67, 72, 73, 79, 84, 85	1.074782	-0.2163	0.189267	-0.161752	1.44303715	2.329037
		188086.7	13	250.0115	15.097938	27	

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Z-Score Analysis
Route Data with Z-Score
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Route_0249	1, 2, 5, 10, 11, 13, 21, 28, 33, 37, 45, 50, 60, 69, 76, 80, 82, 85	0.342716	1.903865	-0.08751	0.9658725	-0.7881716	2.336769
		179148.4	22	240.3721	18.734485	14	
Route_0533	1, 3, 6, 16, 25, 24, 30, 41, 46, 54, 61, 62, 67, 72, 78, 83, 84, 85	0.903397	0.725998	0.348533	-1.072235	1.44303715	2.34873
		185994.1	17	255.5582	12.161664	27	
Route_0505	1, 3, 6, 8, 15, 31, 42, 56, 67, 72, 78, 83, 84, 85	-1.12666	-0.45187	0.11473	1.1828872	2.64445722	2.363549
		161207.7	12	247.4156	19.434349	34	
Route_0398	1, 3, 6, 8, 14, 23, 30, 34, 40, 54, 61, 62, 67, 72, 78, 83, 84, 85	1.060128	0.490424	-0.36062	-1.28507	2.47282578	2.377692
		187907.8	16	230.8607	11.475281	33	
Route_0202	1, 2, 5, 9, 18, 20, 21, 28, 33, 44, 49, 53, 60, 70, 80, 82, 85	0.832135	0.961571	0.884697	-0.370347	0.06998564	2.378042
		185124.1	18	274.2311	14.425227	19	
Route_0567	1, 3, 6, 16, 25, 31, 35, 41, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	0.342273	0.961571	0.160434	1.5415669	-0.6165401	2.389305
		179143	18	249.0073	20.591078	15	
Route_0220	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 37, 45, 50, 60, 70, 80, 82, 85	1.108246	1.668292	0.538098	-0.13613	-0.7881716	2.390334
		188495.3	21	262.1602	15.180568	14	
Route_0488	1, 3, 6, 8, 15, 31, 35, 41, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	0.022268	0.254851	0.080679	2.156594	-0.1016458	2.412746
		175235.8	15	246.2297	22.574517	18	
Route_0227	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 44, 49, 53, 60, 70, 80, 82, 85	0.873436	1.197145	0.661611	0.1434689	-0.4449087	2.430752
		185628.3	19	266.4618	16.082264	16	
Route_0576	1, 3, 6, 16, 25, 31, 42, 51, 55, 61, 65, 81, 83, 84, 85	0.22592	0.254851	0.024852	1.3404558	0.58487995	2.430958
		177722.3	15	244.2854	19.942502	22	
Route_0714	1, 3, 7, 15, 31, 42, 51, 55, 62, 67, 72, 73, 79, 84, 85	-0.42397	-0.68744	0.022022	1.9187794	1.61466858	2.444059
		169787.4	11	244.1869	21.807574	28	
Route_0299	1, 2, 5, 10, 12, 19, 33, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	0.144727	1.197145	0.8265	0.9298126	-0.6165401	2.481644
		176731	19	272.2043	18.618193	15	
Route_0517	1, 3, 6, 16, 25, 24, 30, 34, 40, 54, 61, 62, 67, 72, 73, 79, 84, 85	1.018941	0.019277	0.795827	-0.108228	0.75651139	2.482328
		187404.9	14	271.1361	15.27055	23	
Route_0500	1, 3, 6, 8, 15, 31, 42, 51, 55, 66, 77, 81, 83, 84, 85	-0.61255	-0.2163	0.238716	1.8069198	1.27140571	2.488197
		167484.9	13	251.7336	21.446831	26	
Route_0693	1, 3, 7, 15, 31, 35, 34, 40, 54, 61, 62, 67, 72, 73, 79, 84, 85	1.187049	-0.68744	-0.19399	1.6012966	0.58487995	2.49179
		189457.5	11	236.6638	20.783704	22	
Route_0715	1, 3, 7, 15, 31, 42, 51, 55, 62, 67, 72, 78, 83, 84, 85	-0.43862	0.019277	-0.52786	0.7954621	2.64445722	2.492714
		169608.5	14	225.0361	18.184918	34	
Route_0572	1, 3, 6, 16, 25, 31, 35, 41, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.13512	0.490424	0.314492	1.9399989	-0.1016458	2.508146
		173314.1	16	254.3727	21.876006	18	
Route_0213	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	1.403792	1.668292	0.183816	0.3990834	-1.1314344	2.523548
		192103.8	21	249.8216	16.906611	12	
Route_0518	1, 3, 6, 16, 25, 24, 30, 34, 40, 54, 61, 62, 67, 72, 78, 83, 84, 85	1.004287	0.725998	0.245944	-1.231546	1.78630002	2.530983
		187226	17	251.9853	11.647894	29	
Route_0163	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	0.993052	1.903865	0.063707	0.1948763	-0.6165401	2.538961
		187088.8	22	245.6386	16.248051	15	
Route_0694	1, 3, 7, 15, 31, 35, 34, 40, 54, 61, 62, 67, 72, 78, 83, 84, 85	1.172395	0.019277	-0.74387	0.4779793	1.61466858	2.540446
		189278.5	14	217.513	17.161048	28	
Route_0009	1, 2, 4, 13, 21, 28, 27, 32, 36, 37, 45, 50, 60, 69, 76, 80, 82, 85	0.548222	1.197145	0.322774	1.4360484	-0.959803	2.544386
		181657.6	19	254.6611	20.250785	13	
Route_0274	1, 2, 5, 10, 12, 19, 27, 32, 36, 37, 45, 50, 60, 69, 76, 80, 82, 85	-0.22471	1.668292	0.484325	1.2349904	-0.6165401	2.546356
		172220.2	21	260.2874	19.60238	15	
Route_0016	1, 2, 4, 13, 21, 28, 27, 32, 36, 44, 49, 53, 60, 69, 76, 80, 82, 85	0.313412	0.725998	0.446287	1.7156472	-0.6165401	2.584804
		178790.6	17	258.9627	21.15248	15	
Route_0281	1, 2, 5, 10, 12, 19, 27, 32, 36, 44, 49, 53, 60, 69, 76, 80, 82, 85	-0.45952	1.197145	0.607839	1.5145891	-0.2732772	2.586774
		169353.3	19	264.589	20.504076	17	
Route_0486	1, 3, 6, 8, 15, 31, 35, 41, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	1.307232	0.490424	-0.48615	1.5543122	-0.2732772	2.592545
		190924.9	16	226.4889	20.632181	17	
Route_0139	1, 2, 5, 9, 18, 19, 33, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	0.274124	1.197145	1.005	0.9222862	-0.7881716	2.610383
		178310.9	19	278.4209	18.593921	14	
Route_0157	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	1.427181	0.725998	1.957838	-0.367515	-1.1314344	2.612067
		192389.4	17	311.6053	14.43436	12	
Route_0373	1, 3, 6, 8, 14, 22, 40, 46, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	0.686198	0.254851	0.60882	0.3172177	0.75651139	2.623598
		183342.2	15	264.6232	16.642597	23	
Route_0559	1, 3, 6, 16, 25, 31, 35, 34, 40, 54, 61, 66, 77, 81, 83, 84, 85	0.935222	0.490424	0.239054	1.2498314	-0.2732772	2.641255
		186382.7	16	251.7454	19.650242	17	
Route_0156	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	1.313668	0.019277	2.595399	0.0233802	-1.3030659	2.648658
		191003.4	14	333.8096	15.694983	11	
Route_0452	1, 3, 6, 8, 15, 24, 30, 41, 46, 54, 61, 62, 67, 72, 73, 79, 84, 85	0.981296	-0.2163	0.682049	0.290715	0.92814283	2.665907
		186945.3	13	267.1736	16.557127	24	
Route_0114	1, 2, 5, 9, 18, 19, 27, 32, 36, 37, 45, 50, 60, 69, 76, 80, 82, 85	-0.09531	1.668292	0.662825	1.227464	-0.7881716	2.675094
		173800.1	21	266.504	19.578108	14	
Route_0453	1, 3, 6, 8, 15, 24, 30, 41, 46, 54, 61, 62, 67, 72, 78, 83, 84, 85	0.966643	0.490424	0.132167	-0.832602	1.95793146	2.714563
		186766.4	16	248.0228	12.934471	30	
Route_0121	1, 2, 5, 9, 18, 19, 27, 32, 36, 44, 49, 53, 60, 69, 76, 80, 82, 85	-0.33012	1.197145	0.786338	1.5070628	-0.4449087	2.715512
		170933.2	19	270.8056	20.479804	16	
Route_0362	1, 2, 5, 10, 12, 20, 21, 28, 33, 44, 49, 53, 60, 70, 80, 82, 85	0.702739	1.432718	0.705766	-0.362817	0.24161707	2.720023
		183544.2	20	267.9995	14.449513	20	

Appendix B
Z-Score Analysis
Route Data with Z-Score
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Route_0084	1, 2, 5, 9, 17, 32, 36, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	0.230953	0.725998	1.13224	1.4231134	-0.7881716	2.724132
		177783.8	17	282.8523	20.20907	14	
Route_0402	1, 3, 6, 8, 14, 23, 30, 35, 42, 51, 55, 62, 67, 71, 77, 81, 83, 84, 85	0.590551	0.725998	-0.1807	-0.173894	1.78630002	2.748256
		182174.4	17	237.1267	15.05878	29	
Route_0487	1, 3, 6, 8, 15, 31, 35, 41, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	0.405518	0.725998	-0.05592	1.7811746	-0.1016458	2.755127
		179915.2	17	241.4725	21.363804	18	
Route_0698	1, 3, 7, 15, 31, 35, 41, 46, 54, 61, 62, 67, 72, 73, 79, 84, 85	1.086158	-0.2163	-0.09143	1.7605815	0.24161707	2.780627
		188225.6	13	240.2355	21.297392	20	
Route_0245	1, 2, 5, 10, 11, 13, 21, 28, 33, 37, 38, 39, 50, 60, 70, 80, 82, 85	1.477684	1.668292	0.880273	-0.445644	-0.7881716	2.792434
		193006	21	274.0771	14.182399	14	
Route_0496	1, 3, 6, 8, 15, 31, 42, 51, 55, 61, 65, 81, 83, 84, 85	0.289166	0.019277	-0.1915	1.5800635	1.09977427	2.796781
		178494.5	14	236.7506	20.715228	25	
Route_0371	1, 3, 6, 8, 14, 22, 40, 46, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	1.971163	0.490424	0.041994	-0.285064	0.58487995	2.803397
		199031.3	16	244.8824	14.700261	22	
Route_0195	1, 2, 5, 9, 18, 20, 21, 28, 33, 37, 45, 50, 60, 70, 80, 82, 85	1.066945	1.903865	0.760164	-0.649851	-0.2732772	2.807846
		187991	22	269.894	13.523838	17	
Route_0699	1, 3, 7, 15, 31, 35, 41, 46, 54, 61, 62, 67, 72, 78, 83, 84, 85	1.071504	0.490424	-0.64132	0.6372642	1.27140571	2.829282
		188046.7	16	221.0848	17.674735	26	
Route_0437	1, 3, 6, 8, 15, 24, 30, 34, 40, 54, 61, 62, 67, 72, 73, 79, 84, 85	1.082187	-0.2163	0.57946	0.1314047	1.27140571	2.848161
		188177.1	13	263.6007	16.043357	26	
Route_0492	1, 3, 6, 8, 15, 31, 35, 41, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.07188	0.254851	0.098141	2.1796066	0.41324851	2.873969
		174086.3	15	246.8378	22.648732	21	
Route_0064	1, 2, 5, 9, 17, 27, 33, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	0.249527	1.197145	0.527362	1.517901	-0.6165401	2.875395
		178010.6	19	261.7863	20.514756	15	
Route_0323	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 37, 45, 50, 53, 59, 64, 76, 80, 82, 85	0.863656	2.375012	-0.11522	0.2024068	-0.4449087	2.880942
		185508.9	24	239.407	16.272337	16	
Route_0438	1, 3, 6, 8, 15, 24, 30, 34, 40, 54, 61, 62, 67, 72, 78, 83, 84, 85	1.067533	0.490424	0.029577	-0.991913	2.30119434	2.896816
		187998.2	16	244.45	12.420701	32	
Route_0522	1, 3, 6, 16, 25, 24, 30, 35, 42, 51, 55, 62, 67, 71, 77, 81, 83, 84, 85	0.53471	0.961571	0.425862	-0.12037	1.09977427	2.901547
		181492.6	18	258.2513	15.231393	25	
Route_0564	1, 3, 6, 16, 25, 31, 35, 41, 46, 54, 61, 66, 77, 81, 83, 84, 85	0.834332	0.961571	0.341612	1.4091163	-0.6165401	2.930091
		185150.9	18	255.3172	20.16393	15	
Route_0188	1, 2, 5, 9, 18, 20, 21, 28, 33, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	1.362491	1.903865	0.405882	-0.114637	-0.6165401	2.941061
		191599.6	22	257.5555	15.249881	15	
Route_0034	1, 2, 4, 13, 21, 28, 33, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	0.917661	1.197145	0.664949	1.1265348	-0.959803	2.946486
		186168.3	19	266.578	19.252615	13	
Route_0317	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 75, 82, 85	1.297784	1.197145	1.778907	-0.359984	-0.959803	2.954048
		190809.5	19	305.3737	14.458646	13	
Route_0372	1, 3, 6, 8, 14, 22, 40, 46, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	1.069449	0.725998	0.472224	-0.058202	0.75651139	2.96598
		188021.6	17	259.866	15.431884	23	
Route_0388	1, 3, 6, 8, 14, 23, 30, 34, 40, 46, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	1.231894	0.725998	0.182542	0.0737774	0.75651139	2.970722
		190005	17	249.7773	15.857512	23	
Route_0316	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 63, 68, 74, 85	1.184271	0.490424	2.416468	0.0309107	-1.1314344	2.99064
		189423.5	16	327.578	15.719268	12	
Route_0005	1, 2, 4, 13, 21, 28, 27, 32, 36, 37, 38, 39, 50, 60, 70, 80, 82, 85	1.683191	0.961571	1.29056	0.0245324	-0.959803	3.000051
		195515.2	18	288.3661	15.698698	13	
Route_0270	1, 2, 5, 10, 12, 19, 27, 32, 36, 37, 38, 39, 50, 60, 70, 80, 82, 85	0.910257	1.432718	1.452111	-0.176526	-0.6165401	3.002021
		186077.9	20	293.9924	15.050294	15	
Route_0479	1, 3, 6, 8, 15, 31, 35, 34, 40, 54, 61, 66, 77, 81, 83, 84, 85	0.998468	0.254851	0.022702	1.4894391	0.24161707	3.007077
		187154.9	15	244.2105	20.422968	20	
Route_0377	1, 3, 6, 8, 14, 22, 40, 46, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	0.592053	0.254851	0.626282	0.3402303	1.27140571	3.084822
		182192.7	15	265.2314	16.716812	26	
Route_0508	1, 3, 6, 16, 25, 24, 30, 34, 40, 46, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	1.176053	0.961571	0.789102	0.1273013	0.06998564	3.124013
		189323.2	18	270.9019	16.030124	19	
Route_0110	1, 2, 5, 9, 18, 19, 27, 32, 36, 37, 38, 39, 50, 60, 70, 80, 82, 85	1.039653	1.432718	1.630611	-0.184052	-0.7881716	3.130759
		187657.8	20	300.209	15.026022	14	
Route_0684	1, 3, 7, 15, 31, 35, 34, 40, 46, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	1.34416	0.254851	-0.20072	1.8368262	-0.1016458	3.133475
		191375.8	15	236.4296	21.543278	18	
Route_0355	1, 2, 5, 10, 12, 20, 21, 28, 33, 37, 45, 50, 60, 70, 80, 82, 85	0.937548	2.375012	0.581233	-0.64232	-0.1016458	3.149828
		186411.1	24	263.6624	13.548124	18	
Route_0386	1, 3, 6, 8, 14, 23, 30, 34, 40, 46, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	2.516858	0.961571	-0.38428	-0.528504	0.58487995	3.150521
		205694.1	18	230.0365	13.915175	22	
Route_0569	1, 3, 6, 16, 25, 31, 35, 41, 47, 51, 56, 67, 72, 73, 79, 84, 85	-0.09326	0.019277	0.959783	2.308968	0.06998564	3.26475
		173825.2	14	276.8461	23.065918	19	
Route_0442	1, 3, 6, 8, 15, 24, 30, 35, 42, 51, 55, 62, 67, 71, 77, 81, 83, 84, 85	0.597956	0.725998	0.209495	0.1192628	1.61466858	3.26738
		182264.8	17	250.716	16.0042	28	
Route_0348	1, 2, 5, 10, 12, 20, 21, 28, 33, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	1.233094	2.375012	0.226951	-0.107107	-0.4449087	3.283042
		190019.7	24	251.3239	15.274167	16	
Route_0484	1, 3, 6, 8, 15, 31, 35, 41, 46, 54, 61, 66, 77, 81, 83, 84, 85	0.897578	0.725998	0.125261	1.648724	-0.1016458	3.295914
		185923.1	17	247.7823	20.936656	18	
Route_0506	1, 3, 6, 16, 25, 24, 30, 34, 40, 46, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	2.461017	1.197145	0.222276	-0.47498	-0.1016458	3.303812
		205012.3	19	251.1611	14.087788	18	

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Z-Score Analysis
Route Data with Z-Score
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Route_0387	1, 3, 6, 8, 14, 23, 30, 34, 40, 46, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	1.615144	1.197145	0.045946	-0.301642	0.75651139	3.313104
		194684.4	19	245.02	14.646798	23	
Route_0682	1, 3, 7, 15, 31, 35, 34, 40, 46, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	2.629125	0.490424	-0.76754	1.2345444	-0.2732772	3.313274
		207064.8	16	216.6888	19.600942	17	
Route_0570	1, 3, 6, 16, 25, 31, 35, 41, 47, 51, 56, 67, 72, 78, 83, 84, 85	-0.10792	0.725998	0.4099	1.1856506	1.09977427	3.313406
		173646.3	17	257.6954	19.443261	25	
Route_0392	1, 3, 6, 8, 14, 23, 30, 34, 40, 46, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	1.137748	0.725998	0.200004	0.09679	1.27140571	3.431946
		188855.5	17	250.3854	15.931726	26	
Route_0507	1, 3, 6, 16, 25, 24, 30, 34, 40, 46, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	1.559303	1.432718	0.652506	-0.248118	0.06998564	3.466395
		194002.6	20	266.1446	14.819411	19	
Route_0683	1, 3, 7, 15, 31, 35, 34, 40, 46, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	1.727411	0.725998	-0.33731	1.4614068	-0.1016458	3.475857
		196055.1	17	231.6723	20.332565	18	
Route_0428	1, 3, 6, 8, 15, 24, 30, 34, 40, 46, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	1.239299	0.725998	0.572735	0.3669342	0.58487995	3.489846
		190095.4	17	263.3665	16.802932	22	
Route_0201	1, 2, 5, 9, 18, 20, 21, 28, 33, 44, 49, 53, 60, 69, 76, 80, 82, 85	0.43909	1.197145	0.86397	1.0970218	-0.1016458	3.495581
		180325.1	19	273.5093	19.157437	18	
Route_0219	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 37, 45, 50, 60, 69, 76, 80, 82, 85	0.715201	1.903865	0.517371	1.3312389	-0.959803	3.507873
		183696.3	22	261.4383	19.912778	13	
Route_0226	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 44, 49, 53, 60, 69, 76, 80, 82, 85	0.480391	1.432718	0.640885	1.6108377	-0.6165401	3.548291
		180829.4	20	265.7399	20.814474	15	
Route_0512	1, 3, 6, 16, 25, 24, 30, 34, 40, 46, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	1.081907	0.961571	0.806564	0.1503139	0.58487995	3.585236
		188173.7	18	271.51	16.104339	22	
Route_0688	1, 3, 7, 15, 31, 35, 34, 40, 46, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	1.250015	0.254851	-0.18325	1.8598388	0.41324851	3.594699
		190226.3	15	237.0377	21.617493	21	
Route_0489	1, 3, 6, 8, 15, 31, 35, 41, 47, 51, 56, 67, 72, 73, 79, 84, 85	-0.03002	-0.2163	0.743431	2.5485756	0.58487995	3.630573
		174597.4	13	269.3113	23.838644	22	
Route_0426	1, 3, 6, 8, 15, 24, 30, 34, 40, 46, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	2.524263	0.961571	0.00591	-0.235348	0.41324851	3.669645
		205784.5	18	243.6257	14.860595	21	
Route_0490	1, 3, 6, 8, 15, 31, 35, 41, 47, 51, 56, 67, 72, 78, 83, 84, 85	-0.04467	0.490424	0.193549	1.4252583	1.61466858	3.679229
		174418.5	16	250.1606	20.215987	28	
Route_0573	1, 3, 6, 16, 25, 31, 35, 41, 47, 55, 62, 67, 72, 73, 79, 84, 85	-0.18741	0.019277	0.977255	2.3319806	0.58487995	3.725984
		172675.7	14	277.4547	23.140133	22	
Route_0574	1, 3, 6, 16, 25, 31, 35, 41, 47, 55, 62, 67, 72, 78, 83, 84, 85	-0.20206	0.725998	0.427373	1.2086633	1.61466858	3.77464
		172496.8	17	258.304	19.517476	28	
Route_0427	1, 3, 6, 8, 15, 24, 30, 34, 40, 46, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	1.622549	1.197145	0.436139	-0.008485	0.58487995	3.832227
		194774.8	19	258.6093	15.592218	22	
Route_0361	1, 2, 5, 10, 12, 20, 21, 28, 33, 44, 49, 53, 60, 69, 76, 80, 82, 85	0.309693	1.668292	0.685039	1.1045522	0.06998564	3.837562
		178745.2	21	267.2777	19.181722	19	
Route_0374	1, 3, 6, 8, 14, 22, 40, 46, 47, 51, 56, 67, 72, 73, 79, 84, 85	0.633913	-0.2163	1.271572	0.7091993	1.44303715	3.841426
		182703.8	13	287.7048	17.906724	27	
Route_0375	1, 3, 6, 8, 14, 22, 40, 46, 47, 51, 56, 67, 72, 78, 83, 84, 85	0.619259	0.490424	0.72169	-0.414118	2.47282578	3.890081
		182524.9	16	268.5541	14.284067	33	
Route_0244	1, 2, 5, 10, 11, 13, 21, 28, 33, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	1.084639	1.903865	0.859546	1.0217253	-0.959803	3.909973
		188207.1	22	273.3552	18.914608	13	
Route_0194	1, 2, 5, 9, 18, 20, 21, 28, 33, 37, 45, 50, 60, 69, 76, 80, 82, 85	0.6739	2.139439	0.739437	0.8175182	-0.4449087	3.925385
		183192	23	269.1722	18.256048	16	
Route_0432	1, 3, 6, 8, 15, 24, 30, 34, 40, 46, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	1.145153	0.725998	0.590197	0.3899468	1.09977427	3.951069
		188945.9	17	263.9746	16.877146	25	
Route_0215	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 37, 38, 39, 50, 60, 70, 80, 82, 85	1.850169	1.668292	1.485157	-0.080277	-0.959803	3.963538
		197554	21	295.1433	15.360692	13	
Route_0403	1, 3, 6, 8, 14, 23, 30, 35, 42, 51, 55, 62, 67, 72, 73, 79, 84, 85	0.538265	0.254851	0.482065	0.2180876	2.47282578	3.966094
		181536	15	260.2087	16.322907	33	
Route_0165	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 37, 45, 50, 60, 70, 80, 82, 85	1.439429	1.903865	1.365049	-0.284484	-0.4449087	3.97895
		192539	22	290.9603	14.702131	16	
Route_0404	1, 3, 6, 8, 14, 23, 30, 35, 42, 51, 55, 62, 67, 72, 78, 83, 84, 85	0.523612	0.961571	-0.06782	-0.90523	3.50261441	4.01475
		181357.1	18	241.058	12.70025	39	
Route_0172	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 44, 49, 53, 60, 70, 80, 82, 85	1.20462	1.432718	1.488562	-0.004885	-0.1016458	4.019369
		189672	20	295.2619	15.603827	18	
Route_0493	1, 3, 6, 8, 15, 31, 35, 41, 47, 55, 62, 67, 72, 73, 79, 84, 85	-0.12416	-0.2163	0.760904	2.5715883	1.09977427	4.091807
		173447.9	13	269.9198	23.912859	25	
Route_0158	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	1.734975	1.903865	1.010767	0.2507291	-0.7881716	4.112165
		196147.5	22	278.6218	16.428174	14	
Route_0004	1, 2, 4, 13, 21, 28, 27, 32, 36, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	1.290145	1.197145	1.269833	1.4919012	-1.1314344	4.11759
		190716.2	19	287.6442	20.430908	12	
Route_0523	1, 3, 6, 16, 25, 24, 30, 35, 42, 51, 55, 62, 67, 72, 73, 79, 84, 85	0.482425	0.490424	1.088625	0.2716115	1.78630002	4.119385
		180854.2	16	281.3333	16.495519	29	
Route_0269	1, 2, 5, 10, 12, 19, 27, 32, 36, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	0.517212	1.668292	1.431385	1.2908432	-0.7881716	4.11956
		181278.9	21	293.2706	19.782503	14	
Route_0494	1, 3, 6, 8, 15, 31, 35, 41, 47, 55, 62, 67, 72, 78, 83, 84, 85	-0.13882	0.490424	0.211021	1.4482709	2.1295629	4.140463
		173269	16	250.7691	20.290202	31	
Route_0524	1, 3, 6, 16, 25, 24, 30, 35, 42, 51, 55, 62, 67, 72, 78, 83, 84, 85	0.467771	1.197145	0.538742	-0.851706	2.81608866	4.168041
		180675.3	19	262.1826	12.872863	35	

Appendix B
Z-Score Analysis
Route Data with Z-Score
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Route_0389	1, 3, 6, 8, 14, 23, 30, 34, 40, 46, 47, 51, 56, 67, 72, 73, 79, 84, 85	1.179608	0.254851	0.845295	0.465759	1.44303715	4.18855
		189366.6	15	272.8589	17.121638	27	
Route_0390	1, 3, 6, 8, 14, 23, 30, 34, 40, 46, 47, 51, 56, 67, 72, 78, 83, 84, 85	1.164955	0.961571	0.295412	-0.657558	2.47282578	4.237205
		189187.7	18	253.7082	13.498981	33	
Route_0109	1, 2, 5, 9, 18, 19, 27, 32, 36, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	0.646608	1.668292	1.609884	1.2833168	-0.959803	4.248298
		182858.8	21	299.4872	19.758231	13	
Route_0354	1, 2, 5, 10, 12, 20, 21, 28, 33, 37, 45, 50, 60, 69, 76, 80, 82, 85	0.544503	2.610586	0.560506	0.8250486	-0.2732772	4.267367
		181612.1	25	262.9406	18.280333	17	
Route_0378	1, 3, 6, 8, 14, 22, 40, 46, 47, 55, 62, 67, 72, 73, 79, 84, 85	0.539767	-0.2163	1.289045	0.732212	1.95793146	4.30266
		181554.3	13	288.3133	17.980939	30	
Route_0325	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 37, 45, 50, 60, 70, 80, 82, 85	1.310033	2.375012	1.186118	-0.276954	-0.2732772	4.320932
		190959.1	24	284.7287	14.726417	17	
Route_0509	1, 3, 6, 16, 25, 24, 30, 34, 40, 46, 47, 51, 56, 67, 72, 73, 79, 84, 85	1.123767	0.490424	1.451854	0.519283	0.75651139	4.34184
		188684.8	16	293.9835	17.294251	23	
Route_0685	1, 3, 7, 15, 31, 35, 34, 40, 46, 47, 51, 56, 67, 72, 73, 79, 84, 85	1.291875	-0.2163	0.462036	2.2288079	0.58487995	4.351303
		190737.4	13	259.5112	22.807405	22	
Route_0379	1, 3, 6, 8, 14, 22, 40, 46, 47, 55, 62, 67, 72, 78, 83, 84, 85	0.525114	0.490424	0.739162	-0.391105	2.9877201	4.351315
		181375.4	16	269.1626	14.358282	36	
Route_0332	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 44, 49, 53, 60, 70, 80, 82, 85	1.075223	1.903865	1.309631	0.002645	0.06998564	4.36135
		188092.1	22	289.0303	15.628112	19	
Route_0577	1, 3, 6, 16, 25, 31, 42, 51, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.13801	0.490424	0.885314	2.0434283	1.09977427	4.380933
		173278.9	16	274.2526	22.209563	25	
Route_0190	1, 2, 5, 9, 18, 20, 21, 28, 33, 37, 38, 39, 50, 60, 70, 80, 82, 85	1.808868	1.903865	1.707224	-0.593998	-0.4449087	4.38105
		197049.7	22	302.8772	13.703962	16	
Route_0510	1, 3, 6, 16, 25, 24, 30, 34, 40, 46, 47, 51, 56, 67, 72, 78, 83, 84, 85	1.109114	1.197145	0.901972	-0.604034	1.78630002	4.390496
		188505.9	19	274.8328	13.671594	29	
Route_0686	1, 3, 7, 15, 31, 35, 34, 40, 46, 47, 51, 56, 67, 72, 78, 83, 84, 85	1.277221	0.490424	-0.08785	1.1054906	1.61466858	4.399958
		190558.4	16	240.3605	19.184748	28	
Route_0556	1, 3, 6, 16, 25, 31, 35, 34, 40, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.473009	0.490424	0.6693	1.7259455	0.06998564	4.428664
		192949	16	266.7295	21.185692	19	
Route_0318	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 37, 38, 39, 50, 53, 59, 64, 76, 80, 82, 85	1.605579	2.375012	0.831836	0.2582596	-0.6165401	4.454146
		194567.6	24	272.3902	16.45246	15	
Route_0443	1, 3, 6, 8, 15, 24, 30, 35, 42, 51, 55, 62, 67, 72, 73, 79, 84, 85	0.54567	0.254851	0.872258	0.5112445	2.30119434	4.485218
		181626.4	15	273.7979	17.268327	32	
Route_0555	1, 3, 6, 16, 25, 31, 35, 34, 40, 46, 47, 55, 66, 77, 81, 83, 84, 85	0.945903	0.490424	0.912554	1.9003532	0.24161707	4.490852
		186513.1	16	275.2013	21.748151	20	
Route_0444	1, 3, 6, 8, 15, 24, 30, 35, 42, 51, 55, 62, 67, 72, 78, 83, 84, 85	0.531017	0.961571	0.322375	-0.612073	3.33098297	4.533873
		181447.5	18	254.6472	13.64567	38	
Route_0393	1, 3, 6, 8, 14, 23, 30, 34, 40, 46, 47, 55, 62, 67, 72, 73, 79, 84, 85	1.085463	0.254851	0.862767	0.4887717	1.95793146	4.649784
		188217.1	15	273.4674	17.195853	30	
Route_0394	1, 3, 6, 8, 14, 23, 30, 34, 40, 46, 47, 55, 62, 67, 72, 78, 83, 84, 85	1.070809	0.961571	0.312884	-0.634546	2.9877201	4.698439
		188038.2	18	254.3167	13.573196	36	
Route_0429	1, 3, 6, 8, 15, 24, 30, 34, 40, 46, 47, 51, 56, 67, 72, 73, 79, 84, 85	1.187013	0.254851	1.235488	0.7589159	1.27140571	4.707673
		189457	15	286.4481	18.067058	26	
Route_0561	1, 3, 6, 16, 25, 31, 35, 41, 46, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.372119	0.961571	0.771858	1.8852304	-0.2732772	4.717501
		191717.1	18	270.3013	21.69938	17	
Route_0350	1, 2, 5, 10, 12, 20, 21, 28, 33, 37, 38, 39, 50, 60, 70, 80, 82, 85	1.679471	2.375012	1.528293	-0.586467	-0.2732772	4.723032
		195469.8	24	296.6456	13.728247	17	
Route_0497	1, 3, 6, 8, 15, 31, 42, 51, 55, 62, 67, 71, 77, 81, 83, 84, 85	-0.07476	0.254851	0.668962	2.283036	1.61466858	4.746756
		174051.1	15	266.7178	22.982288	28	
Route_0430	1, 3, 6, 8, 15, 24, 30, 34, 40, 46, 47, 51, 56, 67, 72, 78, 83, 84, 85	1.172359	0.961571	0.685605	-0.364401	2.30119434	4.756328
		189278.1	18	267.2974	14.444401	32	
Route_0476	1, 3, 6, 8, 15, 31, 35, 34, 40, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.536255	0.254851	0.452949	1.9655532	0.58487995	4.794487
		193721.2	15	259.1947	21.958418	22	
Route_0551	1, 3, 6, 16, 25, 31, 35, 34, 40, 46, 47, 55, 61, 65, 81, 83, 84, 85	1.847617	0.725998	0.482339	1.6734969	0.06998564	4.799436
		197522.8	17	260.2182	21.016547	19	
Route_0513	1, 3, 6, 16, 25, 24, 30, 34, 40, 46, 47, 55, 62, 67, 72, 73, 79, 84, 85	1.029622	0.490424	1.469327	0.5422956	1.27140571	4.803074
		187535.3	16	294.592	17.368465	26	
Route_0689	1, 3, 7, 15, 31, 35, 34, 40, 46, 47, 55, 62, 67, 72, 73, 79, 84, 85	1.197729	-0.2163	0.479509	2.2518205	1.09977427	4.812537
		189587.9	13	260.1197	22.88162	25	
Route_0514	1, 3, 6, 16, 25, 24, 30, 34, 40, 46, 47, 55, 62, 67, 72, 78, 83, 84, 85	1.014968	1.197145	0.919444	-0.581022	2.30119434	4.85173
		187356.4	19	275.4413	13.745809	32	
Route_0475	1, 3, 6, 8, 15, 31, 35, 34, 40, 46, 47, 55, 66, 77, 81, 83, 84, 85	1.009149	0.254851	0.696203	2.1399609	0.75651139	4.856675
		187285.4	15	267.6665	22.520876	23	
Route_0690	1, 3, 7, 15, 31, 35, 34, 40, 46, 47, 55, 62, 67, 72, 78, 83, 84, 85	1.183076	0.490424	-0.07037	1.1285032	2.1295629	4.861192
		189409	16	240.969	19.258963	31	
Route_0214	1, 2, 5, 10, 11, 13, 21, 28, 27, 32, 36, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	1.457124	1.903865	1.464431	1.3870917	-1.1314344	5.081077
		192755	22	294.4215	20.092901	12	
Route_0481	1, 3, 6, 8, 15, 31, 35, 41, 46, 54, 61, 62, 67, 71, 77, 81, 83, 84, 85	1.435364	0.725998	0.555507	2.1248381	0.24161707	5.083324
		192489.3	17	262.7665	22.472106	20	
Route_0164	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 37, 45, 50, 60, 69, 76, 80, 82, 85	1.046384	2.139439	1.344322	1.1828846	-0.6165401	5.096489
		187740	23	290.2385	19.434341	15	

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Route Data with Z-Score
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Route_0171	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 44, 49, 53, 60, 69, 76, 80, 82, 85	0.811574	1.668292	1.467836	1.4624833	-0.2732772	5.136908
		184873	21	294.5401	20.336037	17	
Route_0471	1, 3, 6, 8, 15, 31, 35, 34, 40, 46, 47, 55, 61, 65, 81, 83, 84, 85	1.910863	0.490424	0.265987	1.9131046	0.58487995	5.165259
		198295	16	252.6834	21.789273	22	
Route_0433	1, 3, 6, 8, 15, 24, 30, 34, 40, 46, 47, 55, 62, 67, 72, 73, 79, 84, 85	1.092868	0.254851	1.25296	0.7819285	1.78630002	5.168907
		188307.5	15	287.0566	18.141273	29	
Route_0434	1, 3, 6, 8, 15, 24, 30, 34, 40, 46, 47, 55, 62, 67, 72, 78, 83, 84, 85	1.078214	0.961571	0.703078	-0.341389	2.81608866	5.217562
		188128.6	18	267.9059	14.518616	35	
Route_0324	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 37, 45, 50, 60, 69, 76, 80, 82, 85	0.916988	2.610586	1.165391	1.1904151	-0.4449087	5.438471
		186160.1	25	284.0068	19.458626	16	
Route_0331	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 44, 49, 53, 60, 69, 76, 80, 82, 85	0.682178	2.139439	1.288905	1.4700138	-0.1016458	5.478889
		183293.1	23	288.3084	20.360322	18	
Route_0189	1, 2, 5, 9, 18, 20, 21, 28, 33, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	1.415823	2.139439	1.686497	0.873371	-0.6165401	5.498589
		192250.7	23	302.1554	18.436171	15	
Route_0160	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 37, 38, 39, 50, 60, 70, 80, 82, 85	2.181353	1.903865	2.312108	-0.228631	-0.6165401	5.552154
		201597.7	22	323.9435	14.882255	15	
Route_0578	1, 3, 6, 16, 25, 31, 42, 51, 55, 62, 67, 72, 73, 79, 84, 85	-0.19029	0.019277	1.548077	2.43541	1.78630002	5.598771
		172640.5	14	297.3346	23.473689	29	
Route_0557	1, 3, 6, 16, 25, 31, 35, 34, 40, 54, 61, 62, 67, 72, 73, 79, 84, 85	1.420724	0.019277	1.332063	2.1179272	0.75651139	5.646502
		192310.6	14	289.8115	22.449819	23	
Route_0579	1, 3, 6, 16, 25, 31, 42, 51, 55, 62, 67, 72, 78, 83, 84, 85	-0.20495	0.725998	0.998194	1.3120927	2.81608866	5.647426
		172461.6	17	278.1839	19.851032	35	
Route_0558	1, 3, 6, 16, 25, 31, 35, 34, 40, 54, 61, 62, 67, 72, 78, 83, 84, 85	1.40607	0.725998	0.78218	0.9946099	1.78630002	5.695158
		192131.7	17	270.6608	18.827162	29	
Route_0349	1, 2, 5, 10, 12, 20, 21, 28, 33, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	1.286426	2.610586	1.507566	0.8809015	-0.4449087	5.840571
		190670.8	25	295.9237	18.460457	16	
Route_0320	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 37, 38, 39, 50, 60, 70, 80, 82, 85	2.051956	2.375012	2.133177	-0.221101	-0.4449087	5.894136
		200017.8	24	317.7118	14.90654	16	
Route_0562	1, 3, 6, 16, 25, 31, 35, 41, 46, 54, 61, 62, 67, 72, 73, 79, 84, 85	1.319833	0.490424	1.434621	2.277212	0.41324851	5.935339
		191078.7	16	293.3833	22.963506	21	
Route_0498	1, 3, 6, 8, 15, 31, 42, 51, 55, 62, 67, 72, 73, 79, 84, 85	-0.12705	-0.2163	1.331725	2.6750177	2.30119434	5.964594
		173412.7	13	289.7998	24.246415	32	
Route_0563	1, 3, 6, 16, 25, 31, 35, 41, 46, 54, 61, 62, 67, 72, 78, 83, 84, 85	1.30518	1.197145	0.884738	1.1538947	1.44303715	5.983994
		190899.8	19	274.2326	19.34085	27	
Route_0477	1, 3, 6, 8, 15, 31, 35, 34, 40, 54, 61, 62, 67, 72, 73, 79, 84, 85	1.483969	-0.2163	1.115712	2.3575349	1.27140571	6.012325
		193082.8	13	282.2767	23.222544	26	
Route_0499	1, 3, 6, 8, 15, 31, 42, 51, 55, 62, 67, 72, 78, 83, 84, 85	-0.1417	0.490424	0.781843	1.5517004	3.33098297	6.013249
		173233.8	16	270.649	20.623758	38	
Route_0478	1, 3, 6, 8, 15, 31, 35, 34, 40, 54, 61, 62, 67, 72, 78, 83, 84, 85	1.469316	0.490424	0.565829	1.2342176	2.30119434	6.060981
		192903.9	16	263.1259	19.599888	32	
Route_0548	1, 3, 6, 16, 25, 31, 35, 34, 40, 46, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	1.577836	0.961571	1.325338	2.3534568	0.06998564	6.288187
		194228.9	18	289.5773	23.209393	19	
Route_0482	1, 3, 6, 8, 15, 31, 35, 41, 46, 54, 61, 62, 67, 72, 73, 79, 84, 85	1.383079	0.254851	1.21827	2.5168197	0.92814283	6.301162
		191850.9	15	285.8484	23.736232	24	
Route_0483	1, 3, 6, 8, 15, 31, 35, 41, 46, 54, 61, 62, 67, 72, 78, 83, 84, 85	1.368425	0.961571	0.668387	1.3935024	1.95793146	6.349817
		191672	18	266.6977	20.113576	30	
Route_0546	1, 3, 6, 16, 25, 31, 35, 34, 40, 46, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	2.8628	1.197145	0.758513	1.751175	-0.1016458	6.467986
		209917.9	19	269.8365	21.267056	18	
Route_0547	1, 3, 6, 16, 25, 31, 35, 34, 40, 46, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	1.961086	1.432718	1.188742	1.9780374	0.06998564	6.630569
		198908.3	20	284.8201	21.998679	19	
Route_0468	1, 3, 6, 8, 15, 31, 35, 34, 40, 46, 47, 51, 56, 67, 71, 77, 81, 83, 84, 85	1.641081	0.725998	1.108987	2.5930645	0.58487995	6.65401
		195001.1	17	282.0425	23.982119	22	
Route_0159	1, 2, 5, 9, 18, 20, 21, 28, 27, 32, 36, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	1.788307	2.139439	2.291382	1.2387374	-0.7881716	6.669693
		196798.7	23	323.2216	19.614464	14	
Route_0552	1, 3, 6, 16, 25, 31, 35, 34, 40, 46, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	1.48369	0.961571	1.3428	2.3764694	0.58487995	6.749411
		193079.4	18	290.1855	23.283608	22	
Route_0466	1, 3, 6, 8, 15, 31, 35, 34, 40, 46, 47, 51, 56, 62, 61, 65, 81, 83, 84, 85	2.926046	0.961571	0.542161	1.9907827	0.41324851	6.833809
		210690.2	18	262.3017	22.039782	21	
Route_0467	1, 3, 6, 8, 15, 31, 35, 34, 40, 46, 47, 51, 56, 62, 66, 77, 81, 83, 84, 85	2.024332	1.197145	0.972391	2.2176451	0.58487995	6.996392
		199680.5	19	277.2852	22.771405	22	
Route_0319	1, 2, 5, 10, 12, 20, 21, 28, 27, 32, 36, 37, 38, 39, 50, 60, 69, 76, 80, 82, 85	1.658911	2.610586	2.112451	1.2462679	-0.6165401	7.011675
		195218.8	25	316.99	19.63875	15	
Route_0472	1, 3, 6, 8, 15, 31, 35, 34, 40, 46, 47, 55, 62, 67, 71, 77, 81, 83, 84, 85	1.546936	0.725998	1.126449	2.6160771	1.09977427	7.115234
		193851.6	17	282.6506	24.056333	25	
Route_0549	1, 3, 6, 16, 25, 31, 35, 34, 40, 46, 47, 51, 56, 67, 72, 73, 79, 84, 85	1.52555	0.490424	1.988091	2.7454385	0.75651139	7.506015
		193590.5	16	312.6589	24.473519	23	
Route_0550	1, 3, 6, 16, 25, 31, 35, 34, 40, 46, 47, 51, 56, 67, 72, 78, 83, 84, 85	1.510896	1.197145	1.438208	1.6221211	1.78630002	7.55467
		193411.6	19	293.5082	20.850863	29	
Route_0469	1, 3, 6, 8, 15, 31, 35, 34, 40, 46, 47, 51, 56, 67, 72, 73, 79, 84, 85	1.588796	0.254851	1.771739	2.9850461	1.27140571	7.871838
		194362.7	15	305.1241	25.246245	26	
Route_0470	1, 3, 6, 8, 15, 31, 35, 34, 40, 46, 47, 51, 56, 67, 72, 78, 83, 84, 85	1.574142	0.961571	1.221857	1.8617288	2.30119434	7.920493
		194183.8	18	285.9734	21.623588	32	

Appendix B
Z-Score Analysis
Route Data with Z-Score
Montgomery - Callaway Connector Project

Schedule JD-D1

Route_0553	1, 3, 6, 16, 25, 31, 35, 34, 40, 46, 47, 55, 62, 67, 72, 73, 79, 84, 85	1.431405	0.490424	2.005563	2.7684511	1.27140571	7.967249
		192441	16	313.2674	24.547734	26	
Route_0554	1, 3, 6, 16, 25, 31, 35, 34, 40, 46, 47, 55, 62, 67, 72, 78, 83, 84, 85	1.416751	1.197145	1.455681	1.6451338	2.30119434	8.015904
		192262.1	19	294.1167	20.925077	32	
Route_0473	1, 3, 6, 8, 15, 31, 35, 34, 40, 46, 47, 55, 62, 67, 72, 73, 79, 84, 85	1.49465	0.254851	1.789212	3.0080588	1.78630002	8.333072
		193213.2	15	305.7326	25.32046	29	
Route_0474	1, 3, 6, 8, 15, 31, 35, 34, 40, 46, 47, 55, 62, 67, 72, 78, 83, 84, 85	1.479997	0.961571	1.239329	1.8847414	2.81608866	8.381727
		193034.3	18	286.5819	21.697803	35	
	Max	210690.2	25	333.8096	25.917435	39	
	Average	174963.9	13.91817	243.4199	15.619582	18.592233	
	Min	148076.9	2	138.989	8.7789267	9	

Appendix C - Minimum/Maximum Analysis Tables

Appendix C
Minimum - Maximum Analysis
Route Data
Montgomery - Callaway Connector
Project

Schedule JD-D1

Route	Segments	Total Length (miles)	Heavy Angles (> 40 degrees) (number)	Road Crossings (number)	Length Not Along Roads (miles)	Number of Pipeline Crossings (number)	Length Not Parallel Existing T-Line (miles)	T-Line Crossings (number)	Wetlands within ROW (acres)	Length through Bat Zone 3 (feet)	Length through Bat Zone 2 (feet)	River/ Stream/ Waterways Crossed (number)	Waterbodies within the ROW (number)	Floodplain in ROW (acres)	Floodway in ROW (acres)	Woodlands within ROW (acres)	Historical /NRHP Districts or Sites within 1320 ft (number)	Archaeological Sites within ROW (number)	Residences within 100 ft of Centerline (number)	Residences within 101 to 300 ft of Centerline (number)	Residences within 301 to 500 ft of Centerline (number)	Residential Proximity Score (score)	Landowners within ROW (number)	Length Not Along Parcel Boundary (number)	Businesses within 300 ft (number)	Industrial Facilities within 100 ft of centerline (number)	Public Facilities within 500 ft (number)	Protected lands within 500 ft of centerline (number)	Grassland/ Pasture within ROW (acres)	Croplands within ROW (acres)	Center-Pivot Irrigation within 100 ft of Centerline (number)
1	1,2,4,7,10,11,12,13	33.18	9	36	28.99	0	30.64	9	9.32	0	22727.32	27	4	21.64	0	187.76	0	0	0	7	10	31	115	25.12	0	1	0	0	148.19	228.88	1
2	1,2,4,6,10,11,12,13	32.52	11	37	28.27	0	29.98	9	9.06	0	32107.00	29	12	17.67	0	153.46	0	0	0	7	9	30	101	22.65	0	1	0	0	178.54	216.29	1
3	1,2,5,9,11,12,13	29.64	7	36	28.19	0	29.33	8	17.13	0	47304.37	32	6	41.44	0	198.12	0	0	0	14	17	59	102	21.68	0	1	0	1	168.14	140.91	0
4	1,2,5,8,12,13	29.88	6	34	29.81	0	23.31	8	20.54	0	53855.79	32	6	47.17	0	220.81	0	1	1	10	14	49	98	25.51	0	1	0	1	135.24	161.89	0
5	1,3,13	28.04	2	22	28.04	0	0.00	6	15.33	0	53267.34	30	7	36.16	0	265.14	0	6	1	6	6	29	97	26.18	0	1	0	0	66.40	162.71	0
Max		33.18	11	37	29.81	0	30.64	9	20.54	0	53855.79	32	12	47.17	0	265.14	0	6	1	14	17	59	115	26.18	0	1	0	1	178.54	228.88	1
Average		30.65	7	33	28.66	0	22.65	8	14.28	0	41852.36	30	7	32.82	0	205.06	0	1.4	0.4	8.8	11.2	39.6	102.6	24.23	0	1	0	0.4	139.30	182.13	0.4
Min		28.04	2	22	28.04	0	0	6	9.06	0	22727.32	27	4	17.67	0	153.46	0	0	0	6	6	29	97	21.68	0	1	0	0	66.40	140.91	0
St. Dev		2.14	3.39	6.24	0.74	0	13.00	1.22	5.01	0	13827.94	2.12	3	12.71	0	41.43	0	2.61	0.55	3.27	4.32	13.63	7.23	1.95	0	0	0	0.55	44.11	38.21	0.55

Appendix C
Minimum - Maximum Analysis
Unweighted Scores
Montgomery - Callaway
Connector Project

Schedule JD-D1

Route	Segments	Total Length (miles)	Heavy Angles (> 40 degrees) (number)	Road Crossings (number)	Length Not Along Roads (miles)	Number of Pipeline Crossings (number)	Length Not Parallel Existing T-Line (miles)	T-Line Crossings (number)	Wetlands within ROW (acres)	Length through Bat Zone 3 (feet)	Length through Bat Zone 2 (feet)	River/Stream/ Waterways Crossed (number)	Waterbodies within the ROW (number)	Floodplain in ROW (acres)	Floodway in ROW (acres)	Woodlands within ROW (acres)	Historical/NRHP Districts or Sites within 1320 ft (number)	Archaeological Sites within ROW (number)	Residences within 100 ft of Centerline (number)	Residences within 101 to 300 ft of Centerline (number)	Residences within 301 to 500 ft of Centerline (number)	Residential Proximity Score (score)	Landowners within ROW (number)	Length Not Along Parcel Boundary (number)	Businesses within 300 ft (number)	Industrial Facilities within 100 ft of centerline (number)	Public Facilities within 500 ft (number)	Protected lands within 500 ft of centerline (number)	Grassland/ Pasture within ROW (acres)	Croplands within ROW (acres)	Center-Pivot Irrigation within 100 ft of Centerline (number)	Unweighted Score
1	1,2,4,7,10,11,12,13	5.00	4.11	4.73	3.15	0	5.00	5.00	1.09	0	1.00	1.00	1.00	1.54	0	2.23	0	1.00	1	1.50	2.45	1.27	5.00	4.06	0	0	0	1	3.92	5.00	5	66.04
2	1,2,4,6,10,11,12,13	4.48	5.00	5.00	1.52	0	4.91	5.00	1.00	0	2.21	2.60	5.00	1.00	0	1.00	0	1.00	1	1.50	2.09	1.13	1.89	1.86	0	0	0	1	5.00	4.43	5	64.62
3	1,2,5,9,11,12,13	2.24	3.22	4.73	1.33	0	4.83	3.67	3.81	0	4.16	5.00	2.00	4.22	0	2.60	0	1.00	1	5.00	5.00	5.00	2.11	1.00	0	0	0	5	4.63	1.00	1	73.55
4	1,2,5,8,12,13	2.43	2.78	4.20	5.00	0	4.04	3.67	5.00	0	5.00	5.00	2.00	5.00	0	3.41	0	1.67	5	3.00	3.91	3.67	1.22	4.41	0	0	0	5	3.46	1.95	1	81.81
5	1,3,13	1.00	1.00	1.00	1.00	0	1.00	1.00	3.18	0	4.92	3.40	2.50	3.51	0	5.00	0	5.00	5	1.00	1.00	1.00	1.00	5.00	0	0	0	1	1.00	1.99	1	52.51

Max	5	5	5	5	0	5	5	5	0	5	5	5	5	0	5	0	5	5	5	5	5	5	5	0	0	0	0	5	5	5	5
Average	3.03	3.22	3.93	2.40	0	3.96	3.67	2.82	0	3.46	3.4	2.5	3.05	0	2.85	0	1.93	2.6	2.4	2.89	2.41	2.24	3.26	0	0	0	0	2.6	3.60	2.87	2.6
Min	1	1	1	1	0	1	1	1	0	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1
St. Dev	1.67	1.51	1.67	1.67	0	1.70	1.63	1.74	0	1.78	1.70	1.5	1.72	0	1.48	0	1.74	2.19	1.64	1.57	1.82	1.61	1.74	0	0	0	0	2.19	1.57	1.74	2.19

Appendix C
Minimum - Maximum Analysis
Weighted Sorted Scores
Montgomery - Callaway
Connector Project

Schedule JD-D1

	Weights	1	5	3	3	1	3	2	6	8	5	1	2	3	5	7	4	2	0	0	0	10	0	2	2	4	6	4	1	5	7	
Route	Segments	Total Length (miles)	Heavy Angles (> 40 degrees) (number)	Road Crossings (number)	Length Not Along Roads (miles)	Number of Pipeline Crossings (number)	Length Not Parallel Existing T-Line (miles)	T-Line Crossings (number)	Wetlands within ROW (acres)	Length through Bat Zone 3 (feet)	Length through Bat Zone 2 (feet)	River/ Stream/ Waterways Crossed (number)	Waterbodies within the ROW (number)	Floodplain in ROW (acres)	Floodway in ROW (acres)	Woodlands within ROW (acres)	Historical/ NRHP Districts or Sites within 1320 ft (number)	Archaeological Sites within ROW (number)	Residences within 100 ft of Centerline (number)	Residences within 101 to 300 ft of Centerline (number)	Residences within 301 to 500 ft of Centerline (number)	Residential Proximity Score (score)	Landowners within ROW (number)	Length Not Along Parcel Boundary (number)	Businesses within 300 ft (number)	Industrial Facilities within 100 ft of centerline (number)	Public Facilities within 500 ft (number)	Protected lands within 500 ft of centerline (number)	Grassland/Pasture within ROW (acres)	Croplands within ROW (acres)	Center-Pivot Irrigation within 100 ft of Centerline (number)	Weighted Score
5	1,3,13	1.0	5.0	3	3.0	0	3.0	2.0	19.1	0	24.6	3.4	5	10.5	0	35.0	0	10.0	0	0	0	10.0	0	10.0	0	0	0	4	1.0	10.0	7	166.6
2	1,2,4,6,10,11,12,13	4.5	25.0	15	4.6	0	14.7	10.0	6.0	0	11.0	2.6	10	3.0	0	7.0	0	2.0	0	0	0	11.3	0	3.7	0	0	0	4	5.0	22.1	35	196.6
1	1,2,4,7,10,11,12,13	5.0	20.6	14.2	9.4	0	15.0	10.0	6.5	0	5.0	1	2	4.6	0	15.6	0	2.0	0	0	0	12.7	0	8.1	0	0	0	4	3.9	25.0	35	199.6
3	1,2,5,9,11,12,13	2.2	16.1	14.2	4.0	0	14.5	7.3	22.9	0	20.8	5	4	12.7	0	18.2	0	2.0	0	0	0	50.0	0	2.0	0	0	0	20	4.6	5.0	7	232.5
4	1,2,5,8,12,13	2.4	13.9	12.6	15.0	0	12.1	7.3	30.0	0	25.0	5	4	15.0	0	23.9	0	3.3	0	0	0	36.7	0	8.8	0	0	0	20	3.5	9.8	7	255.3