



Steam and Steel in the 1920s a route for



This Project Manual is the first of two manuals designed to introduce you to the Bessemer & Lake Erie route for Train Simulator. The **Project Manual** will acquaint you with the history of the real-world B&LE and how the B&LE has been interpreted in Train Simulator. The remainder of the manual describes what you get in the DLC package. The companion document to this is the **Operations Manual**. In it you will find instructions and other information you'll need for running trains on the route and for operating the B&LE locomotives themselves. Now, let's let our imaginations take us back in time to experience what railroading might have been like a century ago.

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HISTORY

Andrew Carnegie established the Pittsburgh, Bessemer & Lake Erie Railroad Company (PB&LE) in 1897 to carry iron ore from Conneaut, Ohio, on Lake Erie to Carnegie Steel Company plants in and around Pittsburgh, Pennsylvania. Forming a link between his plants and the Great Lakes ore boats arriving in Conneaut from Minnesota's Missabe Iron Range, the railroad was part of Carnegie's plan to form a complete, vertically integrated steel company.

The core of the PB&LE was formed by two small lines that Carnegie absorbed: the Pittsburgh, Shenango AND Lake Erie Railroad, and the Butler & Pittsburgh Railroad. The company was renamed the Bessemer & Lake Erie Railroad (B&LE) in 1900. Carnegie Steel had an exclusive 999 year lease to the B&LE. This lease was acquired by United States Steel (USS) when that company acquired Carnegie Steel in 1901. In 1988 the B&LE was made a part of a USS subsidiary, Transtar, Inc., and subsequently became a part of Great Lakes Transportation, LLC in 2001. Since 2004, the B&LE has been operated as a unit of the Canadian National Railway.

Iron ore was and continues to be the railroad's major freight commodity. The ore is offloaded from lake freighters at Conneaut directly into strings of hopper cars. About ten percent of the ore is stored on-site so that car-loading operations can continue during the winter months when the lake freighters are frozen out. The iron ore is transported to the steel mill at Butler and to the interchange tracks at North Bessemer. From there, trains operated by the USS-owned Union Railroad take the ore to mills in Pittsburgh.

The B&LE transports a large amount of bituminous coal, which is the type found in western Pennsylvania, both in its natural form and as coke. The coal originates from mines located along or near the railroad. Coal products are used at the regional mills, or offloaded at Conneaut and transferred to freighters bound for ports on both sides of the Great Lakes. Coal is also stored at Conneaut during the winter-freeze months to keep the mines, and the railroad, productive.

The railroad also transports limestone, which is used in the steelmaking process, as well as a small amount of general freight. It also operated a modest passenger service.

THE ROUTE

The Bessemer & Lake Erie route is represented in Train Simulator as it would have appeared in the 1920s. Like the prototype railroad, it runs from Conneaut, Ohio to North Bessemer, a suburb of Pittsburgh. Along the way, there are numerous interchange and crossing points with other railroads such as the New York Central, the Pennsylvania, and the Erie. The right-of-way is fairly level, but the surrounding hilly terrain forces it to follow an almost constant series of curves.

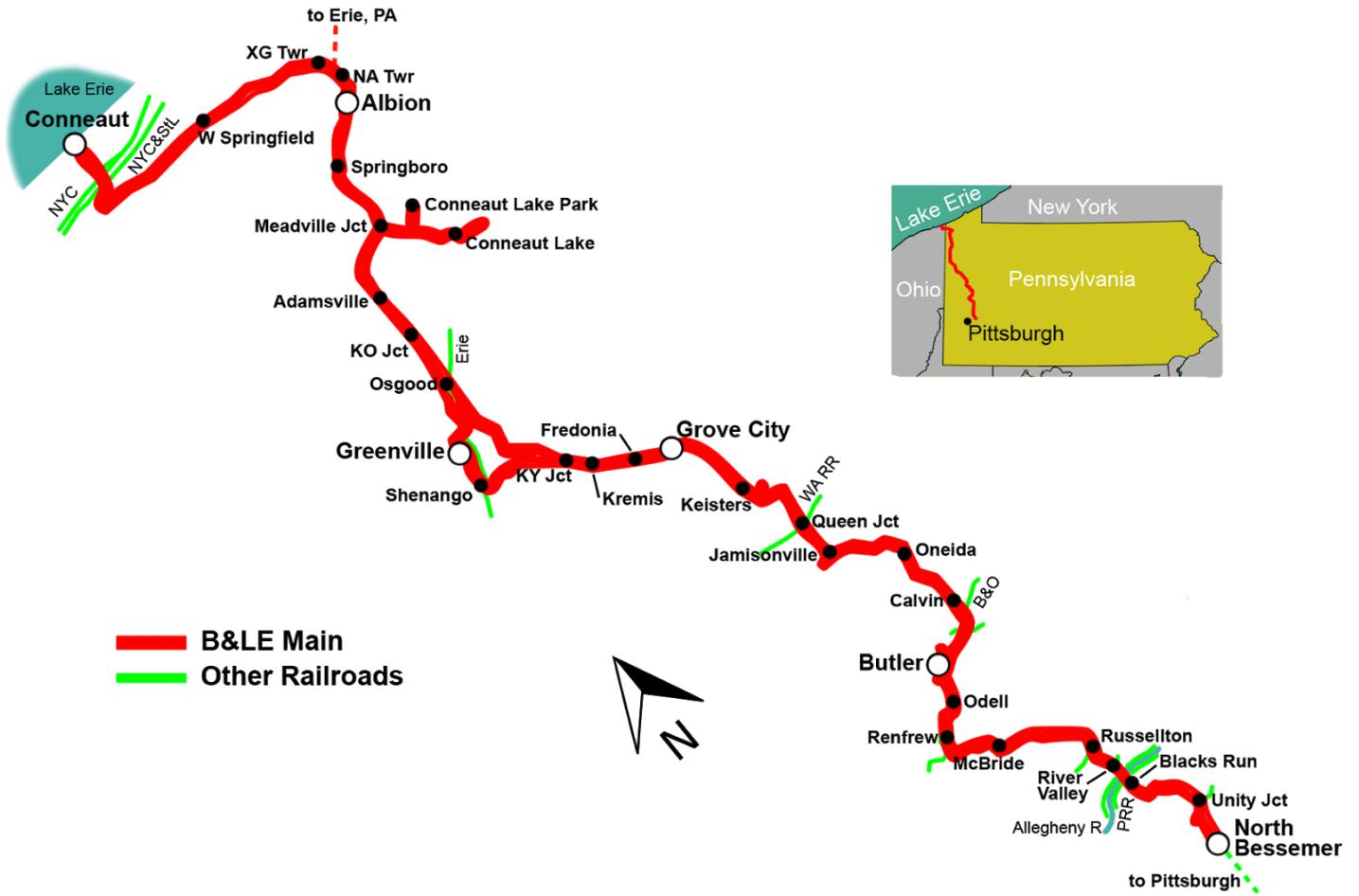
Conneaut (pronounced KONNY-aught), the northern terminus of the railroad, is the site of four gigantic Hulett unloaders which remove iron ore from the incoming lake freighters. A long, moveable bridge crane is also used to manage the large ore-storage yard and to fill a steady stream of southbound ore hoppers during the winter. Conneaut also features several Brownhoist limestone loaders, and a McMyler coal-dumper/ship-loader. Three of the Hulett's are fully animated and are set up for interactive car loading. Hopper cars can be moved into position under them using steam locomotives or electric poling trams. You'll also find an interactive coal unloading ramp and a small locomotive service and maintenance facility at Conneaut. The other industrial equipment at Conneaut is represented for historical purposes only.

Continuing southward, our next major point of interest is the yard complex at Albion. Here, a branch line (not modeled) connects to the Nickel Plate main giving the B&LE trackage rights into Erie, Pennsylvania. At Meadville Junction you can take a passenger train to Conneaut Lake Park and watch the animated amusement rides in action. Greenville is the site of B&LE's maintenance and repair complex, including a 17-stall roundhouse and a 25-stall erecting shop served by a 450-foot-long transfer table.

Arriving in Butler, we marvel at the extensive Standard Steel complex, including facilities for steel production and steel product manufacture; railroad car and railroad car parts production; and automobile production.

Nearing the end of the line, we cross the Allegheny River on a scenic 2,300-foot-long steel bridge 160 feet above the water level. Not far beyond is North Bessemer which is technically the southern end of the B&LE and the location of a large interchange yard. At the south end of the yard the tracks converge to a single track, continuing into a tunnel as the Union Railroad.

ROUTE MAP



LOCOMOTIVES AND ROLLING STOCK

During the steam era, the B&LE owned a variety of locomotive types. The B&LE package includes a "Santa Fe" type 2-10-2 for general haulage duty, and a "Six-Coupled" 0-6-0 for yard switching. All locomotive controls operate using standard algorithms provided in the core code that ships with Train Simulator. No attempt has been made to override or augment these controls by means of scripting or other methods. Make sure you keep up a good head of steam and enjoy your travels along the B&LE route!

Locomotives

Santa Fe Type 2-10-2



The B&LE owned 25 coal-fired "Santa Fe" 2-10-2 steam locomotives. All were built by Baldwin beginning in 1916, including 19 D-1-A class, as modeled here. These locomotives were designed for tractive power rather than speed, hauling heavily laden ore and coal trains over the full route. The locomotives were equipped with a Street mechanical stoker, and a Vanderbilt-style tender. The "Bessemer" labeled tender is provided in both railhead (shown) and block-lettered formats.

Typical Specifications

Loco Weight	203 US ton (184 mT)
Total Loaded Weight	292 US ton (265 mT)
Tractive Power	81,600 lbf (362 kN)
Cylinders	2 @ 30x32
Driver Diameter	63 inches (1.60 m)
Valve Gear	Baker
Coal Capacity	20 US ton (18.2 mT)
Water Capacity	10,000 US gal (37,850 L)

Six-Coupled Type 0-6-0



During the turn-of-the-century era, the B&LE owned eleven coal-fired "Six-Coupled" 0-6-0 steam locomotives. The final seven 0-6-0s, modeled here, were built by Baldwin beginning in 1909. They were used primarily for switching duty in the yards, assembling ore and coal trains. Though the Baldwin delivery included a sloped-back tender, a conventional tender is also included for variety.

Typical Specifications

Weight	91.5 US ton (83.0 mT)
Tractive Power	41,460 lbf (184 kN)
Cylinders	2 @ 22x28
Driver Diameter	50 inches (1.27 m)
Valve Gear	Stephenson
Coal Capacity	10 US ton (9.1 mT)
Water Capacity	6,000 US gal (22,600 L)

Rolling Stock

Freight Equipment

Boxcars



Carrying cargos ranging from food to steel products, boxcars were, and still are today, the railroads' all-purpose freight cars. While the B&LE's main commodities have always been ore and coal, there are always several customers who ship other products. Included in this DLC are two kinds of boxcars: a double-sheathed wooden boxcar with steel frame; and a single-sheathed (outside-braced) boxcar with steel frame.

Asset Browser Naming Breakdown:

BLE Boxcar 40ft Wood [DS / OB] [BLE / UL] [mt / ld]

DS: double-sheathed car

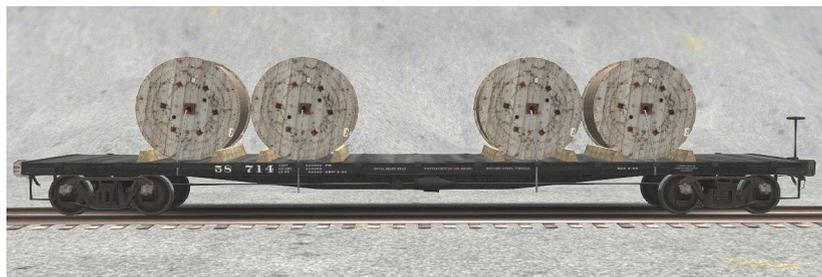
OB: outside-braced car.

BLE: lettered for B&LE.

UL: unlettered car in a variety of different, era-typical colors.

mt / ld: empty or loaded car with appropriate weight setting.

Flatcar (50 ft)



The numerous heavy industries in the greater Pittsburgh area require cars that can handle heavy and large cargo. This heavy-duty 50 ft steel flatcar is a modern design in our route's setting and will usually be seen somewhere around the heavy industries or in interchange service with one of the connecting railroads.

Asset Browser Naming Breakdown:

BLE Flatcar 50 ft Black [Empty / Cargo]

Empty: empty car with appropriate weight setting, available with or without stanchions.

Cargo: loaded and heavy car with one of the following cargo objects: logs, pipes, rails, cable reels, tarpaulin-covered load, railroad ties.

Gondolas



Gondolas were the original heavy-haulers on the B&LE. Before hoppers became widely used in the early 20th century, gondolas could be seen carrying anything from coal, ore and gravel to scrap metal and steel mill products. Coal, ore and other aggregate traffic have mainly been taken over by hoppers in our route's period, but you can still see gondolas in frequent service around the heavy industries or occasionally even loaded with coal and gravel when bound for a smaller customer.

Asset Browser Naming Breakdown:

BLE Gondola Steel [30ft / 40ft] [Empty / Cargo]

30ft: a thirty-foot long 50 ton steel gondola.

40ft: a forty-foot long 50 ton steel gondola.

Empty: empty car with appropriate weight setting.

Cargo: loaded and heavy car with one of the following cargo objects: cable reels, coal, gravel, pipes, scrap metal, trash, steel coils, barrels (only 30 ft car).

Hoppers



Hoppers are the main aggregate haulers on our route. Mainly used in coal and ore traffic, these cars also see service transporting gravel and limestone. Three B&LE liveries are included, the earlier all-black paint schemes and the later orange paint that the railroad adopted to combat the heavy decay inflicted on those cars by the iron ore.

Asset Browser Naming Breakdown:

BLE Hopper 55 ton [Livery] [Weathering] [Cargo] [Load State]

Livery: the following liveries are included:

Black-1: black livery with older lettering scheme.

Black-2: black livery with newer lettering scheme.

Orange: orange livery with newer lettering scheme.

UL: unlettered cars in black or brown livery.

Weathering: there are "clean" and "dirty" versions, though even the clean cars carry some degree of weathering as coal hoppers would rarely ever be truly clean.

Cargo: coal, gravel, iron ore, or limestone.

Load State: empty and loaded versions exist for each cargo, these have appropriate car weights.

Only the empty versions of each car can be used with the interactive cargo transfer points in a scenario.

Pickle Car



The pickle car is a special-purpose rail vehicle from the early 20th century, designed particularly to carry pickled cucumbers and vegetables from their producers to towns and markets.

Asset Browser Naming Breakdown:

BLE Pickle Car [Empty / Loaded]

Empty / Loaded: empty or loaded car with appropriate weight setting.

Refrigerator Car



This is a wood-and-steel body icebox refrigerator car, used to transport agricultural produce and other perishables. Blocks of ice can be filled into boxes below the four hatches on the roof, keeping the interior of the insulated car cool for many hours.

Asset Browser Naming Breakdown:

BLE Reefer 40ft Wooden UL [open / closed] [mt / ld]

open / closed: state of the roof icebox hatches.

mt / ld: empty or loaded car with appropriate weight setting.

Tank Cars



Two oil and petroleum tank cars are included in the route, a 10,000 gallon and an 8,000 gallon car. There are numerous oil fields in this part of Pennsylvania. The B&LE did not own their own fleet of oil tank cars, so these belong to a tank car leasing company.

Asset Browser Naming Breakdown:

BLE Tankcar [8000 / 10000] gal OTLX [empty / loaded]

empty / loaded: empty or loaded car with appropriate weight setting.

Non-Revenue Equipment

Caboose



No train of the 1920s is complete without a caboose. This wooden body four-axle caboose, built in the B&LE's own Greenville shops, is a typical example of a caboose from that era.

Asset Browser Naming Breakdown:

BLE Caboose [1 / 2]

1: Caboose in early livery with block lettering.

2: Caboose in later livery with Bessemer rail head logo.

Crane Car



A small maintenance-of-way and wreck crane for lighter duties. Built on top of an old 30 ft flatcar frame and matched with a similarly home-built boom car.

Asset Browser Naming Breakdown:

BLE Crane Flatcar [(Expanded) / (Collapsed)]

Expanded / Collapsed: whether the crane's boom is up or down.

BLE Crane Boom Car

The matching boom car for the collapsed crane.

Flatcar (30 ft)



A set of old truss-rod frame 30 ft flatcars from the 19th century, now past their use as revenue freight cars and relegated to maintenance-of-way service.

Asset Browser Naming Breakdown:

BLE Flatcar 30 ft Black [Empty / Empty (Bulkheads) / Empty (Stanchions)]

Empty (Stanchions): car fitted with stanchions.

Empty (Bulkheads): car with wooden bulkheads.

Passenger Equipment

Heavyweight Baggage Car



B&LE's all steel heavyweight baggage car, numbers 71-73. Additional unlettered versions inspired by other railroads' liveries have been provided.

Asset Browser Naming Breakdown:

BLE Passenger Baggage Car [(71-73) / color]

71-73: B&LE cars 71, 72, and 73.

Color: unlettered cars in brown, blue & gold, blue, and green paint schemes.

Heavyweight Coach



B&LE's all steel heavyweight coach, numbers 204-209. Additional unlettered versions inspired by other railroads' liveries have been provided.

Asset Browser Naming Breakdown:

BLE Passenger Coach (204-209) / color]

204-209 B&LE cars 204, 205, 206, 207, 208, 209.

Color: unlettered cars in brown, blue & gold, blue, and green paint schemes.

Heavyweight Wooden Commuter Coach



The B&LE rostered a large fleet of smaller wooden passenger cars, often acquired second hand from other railroad companies. This model represents the numerous cars of this type.

Asset Browser Naming Breakdown:

BLE Passenger Coach 350 Series

Low-Poly Freight Cars

Performance-Friendly "Yard Fillers"



Low-detail versions have been provided of the three most common types of cars on the route: the boxcar, the gondola, and the hopper. These cars have had their fine detailing, like ladders, brake gear, etc., substantially reduced. You can thus use them freely in as high numbers as you like to fill up those large yards, particularly in Conneaut, Albion, Butler, and North Bessemer, without having to fear a big drop in graphics performance. Operationally, these cars will act as normal rail vehicles, so you can use them for AI or player trains as well, but of course that might not look as good when they get too close to the player's camera positions.

Asset Browser Naming Breakdown:

BLE Lowpoly Gondola Steel

BLE Lowpoly Hopper 55 ton

BLE Lowpoly Boxcar 40ft Wood

SCENARIOS

Career Scenarios

[Santa Fe] Butler Turn, Part 1

The "Butler Turn" is a local freight that makes a daily round trip between the North Bessemer and Butler freight yards. We will be driving the northbound leg of the turn, from North Bessemer to Butler and points in between. Your loco has been fully serviced and is ready to couple to the cars.

Duration — 30 minutes

Locomotive — Santa Fe 2-10-2

Weather — Winter/Snow showers

Departure — 8:00 am

[Santa Fe] Butler Turn, Part 2

The new train orders have us waiting here in River Valley until a high priority northbound hopper train passes. Then we should be cleared for a non-stop run to Butler Yard.

Duration — 40 minutes

Locomotive — Santa Fe 2-10-2

Weather — Winter/Passing snow

Departure — 8:50 am

[Santa Fe] Conneaut Shuttle, Part 1

In order to move the heavy iron ore from Lake Erie up to the hills of Pennsylvania, the long ore trains were split into two or more sections that were reassembled in Albion Yards. This created a Shuttle assignment for locos based in Albion.

As we begin, we're approaching the yard at Conneaut where we'll need to set out our current consist of loaded coal hoppers. We'll then reverse direction by running around the loop at Dock 4, and prepare to pick up an outbound consist of loaded ore hoppers.

Duration — 20 minutes

Locomotive — Santa Fe 2-10-2

Weather — Autumn/High clouds

Departure — 4:00 pm

[Santa Fe] Conneaut Shuttle, Part 2

We have picked up a second section of an ore shipment at Conneaut and we are ready to move "up the hill" to Albion's B yard.

Duration — 30 minutes

Locomotive — Santa Fe 2-10-2

Weather — Autumn/High clouds

Departure — 4:30 pm

[Santa Fe] Conneaut Shuttle, Part 3

Due to the heavy loads and relatively steep gradients, locomotives on this assignment require frequent servicing, including the sand used for traction. You will carry out this servicing and turn your loco for its next run. We'll use the Erie wye to turn the locomotive around, then couple to a string of hoppers loaded with limestone.

Duration — 40 minutes

Locomotive — Santa Fe 2-10-2

Weather — Autumn/High clouds

Departure — 5:00 pm

[Santa Fe] Conneaut Shuttle, Part 4

We finish our day moving a long string of cars from Albion to our home base at Conneaut. Carefully observe all signals, especially when moving out of Albion 'B' Yard.

Duration — 15 minutes

Locomotive — Santa Fe 2-10-2

Weather — Autumn/High clouds

Departure — 6:00 pm

[Santa Fe] Employee Excursion, Part 1

It's the highlight of the Bessemer Summer, the Employee Excursion to Conneaut Lake Park. Families are looking forward to the ballgames, the beach and certainly the park rides. The company has placed one of its newest, largest and most impressive freight engines at the lead. It will certainly have no trouble with the six heavyweight passenger coaches assigned to carry the employees.

The train has been assembled in the 'back yard,' so we will need to reverse out onto the northbound main before heading for Greenville Station to pick up the company employees.

Duration — 35 minutes

Locomotive — Santa Fe 2-10-2

Weather — Summer/Light Rain

Departure — 8:14 am

[Santa Fe] Employee Excursion, Part 2

Before returning to Greenville, we must turn the train. Since we have all day to get this done, we have been routed to Conneaut Lake village to take on water there. Right now the telegraph reports the line is clear in both directions. We will have plenty of time later to enjoy the Park.

When carrying out a reverse move you should keep your speed below 25 mph, no matter the track limit.

Duration — 30 minutes

Locomotive — Santa Fe 2-10-2

Weather — Summer/High Clouds

Departure — 11:30 am

[Santa Fe] Employee Excursion, Part 3

Before we leave, let's take a quick look around the Park at night. Then we'll drive our train back to Greenville, stopping at Osgood flag stop.

When you're ready, set up the train. We certainly will need our headlight (H key) and lights for the gauges (Y key). It's your call on the cab light (U key).

Duration — 25 minutes

Locomotive — Santa Fe 2-10-2

Weather — Summer/Clear

Departure — 8:00 pm

[Santa Fe] Northbound Empties, Part 1

There have been only few northbound coal trains recently and Conneaut is running out of empty hoppers. Take a train of empties from Butler up north to keep the ore docks supplied with cars.

Your train is ready to depart Butler's Calvin Yard. Check your work order and then depart when ready.

Duration — 50 minutes

Locomotive — Santa Fe 2-10-2

Weather — Summer/High Clouds

Departure — 8:15 am

[Santa Fe] Northbound Empties, Part 2

The passenger train is now ahead of you. The next block will soon clear. Follow the passenger train to Albion from where it will head east to Erie while you turn west to Conneaut.

Duration — 50 minutes

Locomotive — Santa Fe 2-10-2

Weather — Summer/High Clouds

Departure — 9:14 am

[Six Coupled] Interchange Traffic

At Butler, the Bessemer & Lake Erie exchanges freight traffic with the Baltimore and Ohio Railroad, the Pennsylvania Railroad and the regional Buffalo Rochester and Pittsburgh Railroad. We will be moving freight to and from these 3 railroads' interchange sidings.

As with most all yard work, you and your crew will be doing much manual switch setting and will have to figure out how to accomplish each task.

Duration — 60 minutes

Locomotive — Six Coupled 0-6-0

Weather — Summer/Clear

Departure — 5:00 pm

[Six Coupled] Shenango Work Train

There has been a derailment at the gravel spur in Keisters. You have been dispatched to transport a service crew to lift a hopper back onto the tracks.

Duration — 35 minutes

Locomotive — Six Coupled 0-6-0

Weather — Spring/Light Rain

Departure — 10:12 am

[Six Coupled] Yard Work: Standard Steel, Butler

Standard Steel in Butler PA runs on coal energy and it requires a constant supply to produce not only steel and steel products but also railroad cars and automobiles. You are driving one of two 0-6-0 switchers owned by Standard Steel that are used to move freight within the Butler steelmaking facility. Today you will distribute the most recent coal delivery and then collect outgoing rail cars.

We begin by picking up a string of loaded coal hoppers and setting them out at the coal gasifiers and at the small locomotive service facility. After servicing our locomotive, we'll spend the rest of the shift moving an assortment of cars to various points-of-need within the complex.

Duration — 45 minutes

Locomotive — Six Coupled 0-6-0

Weather — Spring/High Clouds

Departure — 12:00 noon

Quick Drive Scenarios

The Bessemer & Lake Erie route is Quick Drive ready. Choose from a selection of steam-powered freight and passenger consists, running northbound or southbound.

Operations Manual

If you would like to try your hand at writing a scenario or two for the Bessemer & Lake Erie route, please consult the B&LE **Operations Manual**, a PDF document that accompanies this **Project Manual** in your Manuals folder. Even if you don't write scenarios, you'll find a lot of additional, interesting information in the Guide about prototypical operations on the route.

ACKNOWLEDGEMENTS

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