Appendix E3. Rail Potential Study (Final Draft)

1. Introduction and Purpose

The purpose of this technical memorandum (TM) is to detail the key attributes and characteristics of employing rail as an effective mode of transportation for some of the Delta Conveyance Project (Project) materials and equipment. The extensive geographic footprint of the Project, as well as the large volume of projected Project materials of various commodity types, requires that all modes of transportation be examined for their relative ease of use, impact on the community, and cost-effectiveness. This TM provides information on key components related to the use of the Rail system within the Project region to move Project materials and equipment. This TM does not include specific recommendations for the Project; rather, instead simply looks at what potential approaches may be taken.

1.1 Summary

The Delta Conveyance Authority (DCA) has identified three probable modes of transportation for the movement of Project materials and equipment: rail, barge, and truck. This TM summarizes the key characteristics associated with using rail as a transportation option for Project materials and equipment. This report also details key components that are unique to rail as compared to other modes.

Unlike trucks, which operate in or upon government rights-of-way (ROWs), rail, with a few exceptions, operates within a ROW owned and maintained by private rail companies.

1.2 Organization

This TM includes the following sections:

- Introduction and Purpose
- Rail Network
- Study Limitations
- References
- Attachment 1 – Preliminary Conceptual Drawings and Technical Memoranda

2. Rail Network

The rail network surrounding the Project region has been in existence for over one-hundred years. The two primary railroads adjacent to the Project are the Union Pacific Railroad Company (UP) and the Burlington Northern Santa Fe Railway Company (BNSF).

Attachment 1 provides an exhibit showing the existing rail lines in the vicinity of the Project. Of the three lines closest to the Project, two are owned by UP and one by BNSF. Each line is controlled by the private railroad companies, although in some cases, the railroads have agreed to allow intercity passenger or regional commuter trains on these lines for the benefit of the public. While passenger and commuter service upon these lines is acceptable to the railroads, the railroads maintain very strict control on the number and frequency of passenger or commuter trains. The railroads do not operate the passenger or commuter trains on these lines; instead they allow regional or state-based transportation agencies to operate the trains. The railroads do control (dispatch) all rail movements on their lines regardless of the trains carry passengers or freight – third party or private dispatching is not permitted.

2.1 Sacramento – Lathrop Line (UP)

The Sacramento-Lathrop rail line, owned by UP, extends south from Sacramento through Stockton and continues to Lathrop before splitting into several lines. This line primarily parallels Interstate 5. This line consists of two UP Subdivisions: (1) the Sacramento Subdivision between Sacramento and Stockton, and (2) the Fresno Subdivision between Stockton and Lathrop. This line serves as a primary freight line for UP and is employed to carry general industrial and agricultural commodities, as well as premium cargos such as intermodal containers and automobiles. The line is capable of handling rail cars of any weight or size. Currently, only freight trains operate between Sacramento and Stockton. However, the San Joaquin Regional Rail Commission, operators of the Altamont Corridor Express passenger services (ACE), has recently announced its desire to seek permission from UP to operate commuter train service over this segment of the line in the near future. They have engaged numerous consultants to plan and design upgrades to the network in anticipation of this new service.

2.2 Antioch – Stockton Line (BNSF)

The Antioch – Stockton rail line, owned by BNSF, traverses from west to east through Antioch across the Delta and through Stockton. It is the BNSF's Stockton Subdivision. The line serves as BNSF's primary freight corridor into and out of the Bay Area. The line is heavily employed by the BNSF for the movement of premium intermodal and automobile trains. In addition, Amtrak operates over the line with its San Joaquins passenger trains. The San Joaquins operate over this corridor seven times per weekday in each direction (fourteen total trains). The line is capable of handling rail cars of any weight or size.

2.3 Lathrop – Byron Line (UP)

The Lathrop – Byron rail line, owned by UP, extends from Lathrop moving southwesterly into Tracy and then northwesterly through the communities of Mountain House, Byron, and Brentwood. It is the Tracy Subdivision of UP. This line once served as a major freight corridor for rail traffic into and out of the Bay Area. However, currently UP only operates local freight service between its Stockton rail yard and its Tracy rail yard, serving various industrial customers along the line. From downtown Tracy, up and through the communities of Mountain House, Byron, and Brentwood, the line serves only as rail car storage for UP. There are currently no industries taking rail service from UP on this portion of the line. The line is maintained to a level suitable for slow rail movements of empty rail cars destined to or coming out of storage. The line has not been utilized for regular freight train service since the early 1990s.

2.4 Right of Way

Railroads typically own and maintain the ROW upon which they operate. Railroads typically obtained this ROW from early landowners through fee title acquisition, or, obtained ROW from the federal government through various Acts of Congress. For the three rail lines described where the DCA might elect to connect a private rail spur, these lines are all owned in fee by the railroads. Railroads, almost exclusively at their own expense, maintain the railroad ROW and rail infrastructure upon which they operate. While the railroads may elect to afford public agencies, such as Amtrak or (ACE), to operate passenger or commuter service upon these lines, the public agencies hold no property rights on these lines. In some cases, the public agency operating the passenger or commuter line participates in the cost of rail infrastructure upgrades or ongoing rail maintenance. Trains running on railroad ROW physically cross paths with the motoring public at some highway crossings. Trains operating on railroad ROW, and

when safe to do so, are not subject to local control with regards to speed nor frequency and are able to operate throughout the year at all times of the day or night.

2.5 Types of Rail Service

In general, rail facilities are designed and constructed to handle either unit train service (full train loads at one time) or manifest service (less than a full train load at one time). The amount of rail infrastructure, holding capacity, and rail car throughput at a facility, all play central roles in determining the type of service that a railroad will support to a proposed facility. Logistical needs of the Project will determine the type of train service to be requested from the railroads.

2.5.1 Unit Train Service

Unit trains are defined by their transportation of large quantities of the same commodity in each rail car. Unit trains are typically in the 100-car size with all cars containing the same commodity originating from the same location. As a result, these trains are the most efficient and cost-effective way to transport goods, because they involve fewer intermediate switching operations than is typical of other trains. Unit trains also reduce costs associated with loading and unloading operations due to their uniformity.

Unit train service requires that the controlling railroad agree to move a train from a specific origin point to a specific destination point. Typically, the origin and destination points are required to have enough rail infrastructure to accommodate all trains operating between the origin and destination points. Railroads do not generally hold unit trains moving from an agreed upon origin and destination in rail yards or on railroad-controlled tracks (such as sidings) between the origin and destination. Typically, once a unit train has departed an origin point, it moves over the rail network direct to the destination – stopping only to allow railroad crews operating the unit train to be changed, if needed. Facilities that are proposed to depart and accept unit train volumes must meet certain engineering and capacity criteria that is above what smaller rail-served industries are required to employ. Facilities that operate in a unit train service environment typically have a much larger physical footprint compared to smaller rail-served industries. Typical commodities that would move by unit train service include aggregates, remediated soil, cement, grain, automobiles, and hydrocarbon products.

2.5.2 Manifest Train Service

Manifest trains are defined by the movement of various commodities from a wide range of origins and destinations. Typically, these rail cars are compiled at an origin site and sorted at an intermediate hub or switching yard, where they are arranged according to their final destinations. This results in longer transportation times, and in some cases, higher operation costs. Manifest train service is offered by every railroad in North America. Most rail cars moving from an origin facility to a destination move via manifest train service. The railroads operate rail yards in locations throughout their networks where these rail cars are aggregated, sorted, and placed on to smaller trains to ultimately arrive at the destination of the shippers' election. The frequency of manifest service that a railroad offers, or would offer, to a given location (existing or new) is based on number of factors. While the railroads may operate over a complete segment of a given line, there is no mandated requirement that the railroad stop and provide service to a new location on any given day or at any guaranteed frequency. Where new manifest locations are proposed to be established, early discussions with the serving railroad are vital to understanding what frequency of service is currently offered in the area (if any). If no manifest service is currently offered by the railroad to a proposed new manifest location, it is common for the administrator or operator of the proposed location to work with the railroad early in the facility design stage to determine what, if any, additional requirements may be needed by the railroad in order to

arrive at a service level that is acceptable to both parties. Typical commodities that would move by manifest train service include lumber, steel, specialty aggregates, general consumer goods, industrial chemicals, and food products.

2.6 New Rail Facilities

An industrial rail facility is a track facility with connection to a mainline that is utilized for the storing, sorting, loading and unloading of rail cars for one or more industries. The maintenance and operation of these facilities can vary in a number of ways based on agreements that determine their shared use. In many cases, the railroad will own the right-of-way, and an industry will lease the track so that they can move about the facility as needed during the loading and unloading process. In other instances, an industry may own the entire industrial track facility starting at a particular clearance point from the railroad mainline. These agreements often depend on the available right-of-way at each site, as well as a customer's existing needs and resources.

The establishment of a new rail facility to be served off an existing rail line, such as may be constructed to support the Project, requires an extensive amount of planning and coordination between the entity or industry electing to construct the facility and the serving railroad or railroads, should more than one railroad have direct access to the facility. Chief among the significant issues that must be coordinated with the connecting railroad prior to commencement of facility construction include: the type of rail service to be offered to the site, how rail cars will be managed at the facility and the specific location and site geometry relative to the railroad network. In addition, and especially for publicly financed rail facilities, the facility should be designed and constructed with the benefits to the community in mind, such as avoiding sensitive areas and allowing maximum usage of the rail footprint by multiple facility operators or facility users.

2.6.1 Unit Train Facility Considerations

1) Unit train facilities require a larger rail footprint to accept or depart an entire train of 100+ rail cars. The facility must be able to hold, or chamber, at least the entire train at the facility;
2) Unit train facilities commonly require additional, sometimes extensive, support rail infrastructure whereby multiple unit trains may be chambered; and,
3) Unit train facilities require a specific type of connection to existing railroad networks. Switches, which are used to allow train access to and from a new facility, are typically fully automated to allow for a railroad employee located in a centralized dispatch location to direct a train into the new facility or to allow the train to continue past the facility to another destination. Automated switches are more involved and expensive than manual switches.

2.6.2 Manifest Facility Considerations

1) Manifest facilities are typically designed to accept or depart a maximum number of rail cars which are delivered by one of the serving railroad's existing local trains operating in the area.
2) Manifest facilities employ a rail footprint that is much smaller than that of a unit train facility, primarily because the rail throughput at a manifest facility is proportionately smaller.
3) Depending on the location of the connection point with the railroad, manifest facilities may or may not employ manual switches that are operated by the train crew delivering rail cars to, and removing rail cars from, the facility.

2.6.3 Internal Movement or Switching of Rail Cars

The movement of rail cars through an industrial rail complex involves “switching operations”, in which trained employees will line a railroad switch for their desired movement from one track to another. The more active or more complex the facility, the more switching operations are required. Efficient track facilities are designed to minimize the amount of switching operations that are required to achieve its ultimate purpose. These operations within an industrial track facility can be performed by one of three different parties: (1) a Class I Railroad (such as UP, BNSF), (2) a short line railroad, or (3) a contract switcher. A comparison of the three alternatives is presented in Section 2.6.4.

At facilities where unit train volumes are handled, it is typical that the serving railroad will deliver the train to a specific location at the facility and then allow the facility owner/operator to move the train, either in full or in segments, to a specified location where the commodity to be handled is either loaded or unloaded. The serving railroad and the facility owner/operator must agree upon the exact location where this handoff occurs, as well as the operational parameters by which the facility owner/operator shall move the train or train segments. In certain situations where the facility owner/operator elects not to have a facility employee move the train, the facility owner/operator may hire a competent and licensed contract switching company to move the train. The contract switching company moves the unit train or train segments to and from a designated location within the facility and then returns the empty or loaded train (depending whether it was emptied or loaded at the facility), back to the serving railroad at the same designated location. The location where the exchanging of train sets between the serving railroad and a contract switching operator is commonly referred to as the “Interchange” or “Drop and Pull” location.

At facilities where very small manifest volumes are handled (less than 20 rail cars per week), it is rare that a facility owner/operator will employ the services of a contract switching company. At most manifest facilities, the serving railroad will deliver the rail cars to the spot where the facility owner/operator will either unload or load the specified commodity without movement of the rail cars, once spotted by the railroad.

In locations where the facility does handle a high volume of manifest rail cars, yet not enough to warrant unit train service, the serving railroad will deliver inbound rail cars to designated and agreed upon facility tracks and allow the facility owner/operator to move the rail cars by means of a private locomotive or other rail car moving device to specified loading or unloading locations. The facility owner/operator places the processed cars back on designated tracks whereby the serving railroad, on a subsequent day, shall remove the cars from the facility. This arrangement may fit best given initial rail car volume projections for Project-based material.

2.6.4 Internal Switching Operators

This section compares the three options for moving railcars within the rail facility; a Class I Railroad, a short line railroad, or a contract switcher.

2.6.4.1 Option 1 – Class I Railroad

In the first case, a Class I Railroad will deliver the rail cars and conduct the necessary switching operations to place them in a predetermined location and at a predetermined day and time. This alternative is often avoided by both the railroad and the customer due its spatial and temporal limitations. For the railroad, it may detract from their main purpose of transporting goods over long distances. Class I Railroads are generally not set up well to support direct engagement at customer yards

along most areas of the rail network, so they avoid conducting complex operations at each customer site. Additionally, the railroads would only agree to operate on tracks that met all of their construction and maintenance standards, with few allowable deviations that would require variances. Meeting these requirements can add significant cost, as railroad standards often exceed federal and state minimum requirements. On the other hand, if the railroad agreed to conduct the switching operations, the facility owner would not have to procure the necessary manpower and locomotives/car movers, potentially saving money during operation of the yard. Ultimately, the extent to which a railroad will operate on a client's track involves negotiation between the parties and ultimately, a business decision internal to the railroad.

2.6.4.2 Option 2 – Short Line Railroad

Short lines are a more commonly used alternative for switching operations within a client's property. This effort represents a larger share of short line revenue than it does for the Class I Railroads, so the short lines often have the available manpower and resources. With a short line conducting the switching operations, the facility owner is able to have more flexibility and control over the process and car delivery scheduling, if needed. However, it is important to note that having sufficient interchange capacity between the short line and the Class I railroad with whom it connects is key to this operation. An interchange involves a siding or other facility where the Class I Railroad delivers rail cars and picks up "empties" without disturbing other operations within the rail facility and is preceded by a specific interchange agreement between the railroad entities. In many cases, the Class I Railroads may prefer this alternative to serve a particular customer, because short lines are experienced in receiving deliveries and preparing the empty cars for departure with greater service to the customer than Class I Railroads generally prefer to offer.

2.6.4.3 Option 3 – Contract Switcher

A third option is to utilize a contract switcher to handle car movements at the customer's facility. The switcher provides trained employees that work for a contractor and that specializes in railroad operations and maintenance. Many of the same benefits of using a short line can be said of using a contract switcher. They often have the resources and the experience to receive deliveries, conduct the necessary switching operations, and then build a train for departure. In some cases, contract switchers may be a cheaper alternative than Class I direct service or service by a short line, as they are subject to fewer federal regulations than railroads and generally have lower operating costs. Additionally, depending on the region and other factors, the customer may be able to competitively bid the switching contract for a specific duration, providing control over pricing and/or serving offering.

2.6.5 Location of a Facility

The location of a new rail-served facility must consider a multitude of physical, logistical, environmental, and financial factors. Not every piece of land adjacent to an existing rail line is suitable for the placement of a rail-served facility. Railroads, because of their size and engineering tolerances, do not have the ability to navigate sharp turns, nor descend or ascend, in the manner that trucks are able to handle over roads. Typically, rail facilities are established in areas where the topography is relatively flat and unencumbered by features, such as waterways, public roadways, or other physical infrastructures such as significant buildings or private dwellings.

Specific to the Project, the team has evaluated the three rail lines, as described in Section 2, for their suitability for establishment of a new rail facility, denoted the potential as either High, Moderate, or Low (Attachment 1).

Where feasible, a location where all three modes of transportation are possible would be optimum from a logistical standpoint. Such a location would offer the greatest flexibility in the movement of Project materials and equipment. Note, in barge locations where rail infrastructure exists, the amount, condition, and geometric attributes of the rail infrastructure must be thoroughly analyzed to ensure the proposed type of service (unit train and/or manifest) may be handled in a safe and effective manner. The presence of existing rail infrastructure at any particular location does not infer that the location can handle any specific rail volume. Only through a written agreement between the rail infrastructure owner and the serving railroad may new rail service be offered to existing locations. In some cases, the age, current capacity usage, and limited size of the rail infrastructure at the adjacent barge locations would necessitate some form of rail infrastructure upgrade or expansion to handle the proposed Project volumes and commodity types.

2.6.6 Multiuse Rail Facilities

Given the potential volume of materials to be handled on the Project, one or more new rail-served facilities could need to employ more than one operator. For example, it is probable that in one or more instances, the rail infrastructure at a new facility would need to be of such size and capacity to accommodate multiple and simultaneous concrete batch plant operations. Provided that the physical footprint of the site is sufficient, rail infrastructure could be engineered and constructed to allow multiple operations to accept and depart unit or manifest train volumes of material without causing throughput delay.

The design of multiuse rail facilities typically would consider the construction of a common facility rail yard where all unit trains, and even additional manifest volumes of rail cars, could be delivered by the serving railroad. This is where an “interchange” of rail cars would occur. From that common rail yard, a contract switching operator would be employed to move the rail cars to the designated concrete batch plant or other destination. Once processed by the batch plant operator, the contract switching operator would bring the rail cars back to the “interchange” yard where the cars would be picked up again by the serving railroad.

2.6.7 Community Benefits

Project-specific rail-served facilities, such as those being considered for the Project, would have the potential to be significant and positive community assets, both during the period in which the Project is operating as well as when the Project is completed. Rail-served facilities are investments that allow the facility owner/operator to take advantage of rail as an economical transportation option, as well as enabling the owner/operator to move large volumes of products to and from multiple sources without employing high numbers of trucks. Rail’s relative lower carbon footprint in the movement of goods per ton/mile, and rail’s employment of dedicated railroad ROWs that minimize direct contact with the motoring public, must be acknowledged.

Further, at the conclusion of the Project, a rail-served facility originally constructed to handle Project materials and equipment could serve as a job creation tool with ongoing benefits for the community, assuming that Project-based assets may be transferred to local or regional authorities for ownership and/or administration at the conclusion of the Project’s construction. Rail-served industrial lands are not as common as truck-served industrial lands, mainly due to the expanse of the federal and state highway systems constructed in the 20th century, compared to the location of the rail lines that were constructed mainly in the 19th century.

A rail-served industrial complex offers local and regional community economic development professionals the ability to market a location whereby two typically competing modes of transportation are accessible at the same place. Industries looking to enter the local market, or expand or even consolidate multiple existing local facilities, may be encouraged to purchase Project-based facilities. Should an industry elect to use the assets originally constructed for Project materials and equipment, the net gain of jobs that the community realizes could be considered as an indirect result of the investment the Project made in the establishment of the rail-served facility.

2.6.8 Air Quality Emissions Attributes of Rail

Note, the DCA is responsible for accounting for all emissions attributed to Project-related activities and efforts. This includes those emissions tied to the transportation of Project materials and equipment. While all Project transportation modes possess some form of advantage over the other, Rail is noteworthy given its ability to haul large volumes of freight from multiple sources relatively fuel efficiently. There are several key benefits of rail service over that of trucking – the major transportation competitor of rail.

1) According to the American Association of Railroads (AAR) (2018), an industry trade group representing freight rail operators in North America, US freight railroads, on average, are able to transport 1 ton of freight 470 miles on one gallon of diesel fuel.
2) According to the U.S. Environmental Protection Agency (2020), US freight railroads account for just 2.1 percent of US greenhouse gas emissions from transportation. Cars, light trucks, and motorcycles combined produce nearly 66 percent, while trucking generates more than 20 percent.

2.7 Rail Car Types

The Project would be expected to handle a variety of construction-based commodities that are commonly handled by rail. These commodities could range from finished prefabricated tunnel segments, construction aggregate, soil, and large Project-based equipment. Each of these rail car types possesses special attributes and capabilities, allowing for the relative ease of movement and processing of Project-based materials and equipment.

2.7.1 Flat Cars to move Tunnel Segments

Typically, tunnel segments are moved on bulkhead flatcars. The segments are stacked on top of one another and secured with appropriate bracing and tie-downs. An example of such a configuration is shown as a reference drawing B-1 in Attachment 2.

2.7.2 Hopper Cars to move Aggregate Materials

Construction aggregates are commonly moved by rail car. Many quarries and distribution facilities owned or controlled by aggregate producers employ rail as a means to ship upwards of 100 tons per rail car from origin to destination. The typical open top hopper car uses a bottom dump design to allow the ease of discharge of the aggregates into a pit. Loading of a typical open top hopper car is done by large excavator while the car is stationary, or, by means of a fixed loading spout as the car is indexed through the loading cycle. Typical configurations are shown as reference drawing B-2 in Attachment 2.

2.7.3 Gondola Cars to move Soil Materials

Railroads frequently transport large volumes of contaminated soil from source sites requiring remediation to approved, privately-operated processing facilities. At the origin source, the contaminated soil is loaded

into gondola cars and covered for rail transport. At the designated destination point, the soil is unloaded and placed into approved locations for long-term holding. Typical gondola cars are depicted as reference Drawing B-3 in Attachment 2.

2.7.4 Flat Cars to move Project Equipment

Railroads commonly move large equipment, such as excavators, trucks, conveyor segments, drilling pieces, and other excessive weight and/or oversized freight that may have difficulty being transported by trucking. Even where excessive weight is not an issue, in some cases Project equipment on rail offers shippers and facility operators an advantage, as the railroads and not local nor state highway jurisdictions, control the movement from source to the unloading point. Each railroad reviews the type, size and weight of each piece of equipment proposed to be shipped to ensure that when loaded onto a rail car, the shipment may traverse the railroad network safely. Reference Drawing B-4 in Attachment 2 shows examples of typical large equipment that is transported by rail and may be appropriate for the Project.

2.8 Railroad Approval Processes for New or Expanded Facilities

Each railroad employs a process to evaluate whether or not a proposed location is suitable to handle proposed rail volumes. As no two rail sites are ever exactly alike, railroads take a methodical approach to approving new rail-served sites, as well as approving an existing rail-served site for possible expansion. Typically, the process is segmented into three primary steps:

1) Site Identification – During this initial stage, the railroad gathers shipment and other commercial information from the applicant and performs a field review to be attended by both the applicant and the railroad. Conceptual plans are prepared by the applicant or its consultants and submitted to the railroad for conceptual review and approval. The railroad conducts an internal review to confirm the proposed concept meets with the railroad's engineering design criteria as well as the railroad's operational parameters. Written consent by the railroad to serve a specific site for a specific use or volume (or both) is withheld until the railroad has fully examined the applicant's conceptual plan and made the determination that the railroad is capable of providing the service level requested by the applicant.

2) Engineering Design & Track Agreement – Following conceptual approval, the applicant submits formal engineering plans to the railroad for a more in-depth review and approval. Following acceptance of final construction plans for all rail and rail support infrastructure to be constructed, the railroad supplies the applicant a Track Agreement for signature. The Track Agreement covers elements such as track ownership, track maintenance responsibilities, and liability with respect to rail operations at the applicant's rail facility.

3) Construction – Upon full execution of the Track Agreement and the exchange of any monies that the railroad may require as a condition of connecting the applicant's track(s) to the existing rail network, construction of the rail and rail support infrastructure may commence. In cases where the railroad must install a new connection point, the railroad schedules railroad managed crews to perform the work. For rail and rail support infrastructure to be owned and maintained by the applicant, the applicant typically hires a private rail contractor to complete the work. Once all rail and rail support infrastructure has been completed, the railroad and the applicant's rail contractor perform a joint inspection to ensure all work is in line with previously agreed upon plans, and, is safe for rail operations. If safe to do so, the infrastructure is placed into service and rail shipments may commence.

3. Study Limitations

Only very limited discussions occurred with UP and BNSF during this stage of analysis. The exact amount of track and track support infrastructure required to serve any potential or proposed new facility location would depend on several variables, including: volume and frequency of rail service, train makeup, commodities to be moved, and the methods proposed for loading and/or unloading. The serving railroad may raise the possibility of requiring new grade-separated crossings over existing railroad tracks as a condition of rail service to any proposed rail-served facility site. The exact location, width, structural makeup, and potential financial burden of these new grade-separated crossings would need to be addressed in subsequent levels of review and in light of specific locations proposed for new rail facilities, supporting critical Project construction activities.

Preliminary rail layouts developed in this or subsequent stages of analysis should be regarded as visual aids to illustrate the potential use of hypothetical unit train and manifest layouts. Rail car drawings are for visual aid purposes only.

4. References

American Association of Railroads (AAR). 2018. Freight Rail & Preserving the Environment. Accessed February 9, 2020. https://www.aar.org/wp-content/uploads/2018/05/AAR-Railroad-Environment-Issue.pdf.

Burlington Northern Santa Fe Railway (BNSF). 2019. Building or Expanding a Rail-Served Facility. Accessed February 9, 2020. https://www.bnsf.com/ship-with-bnsf/rail-development/build-expand-rail-facility.html

Union Pacific Railroad Company (UP). 2018. Building or Expanding a Rail Served Facility. Accessed February 9, 2020. https://www.up.com/customers/ind-dev/process_track-construction/index.htm

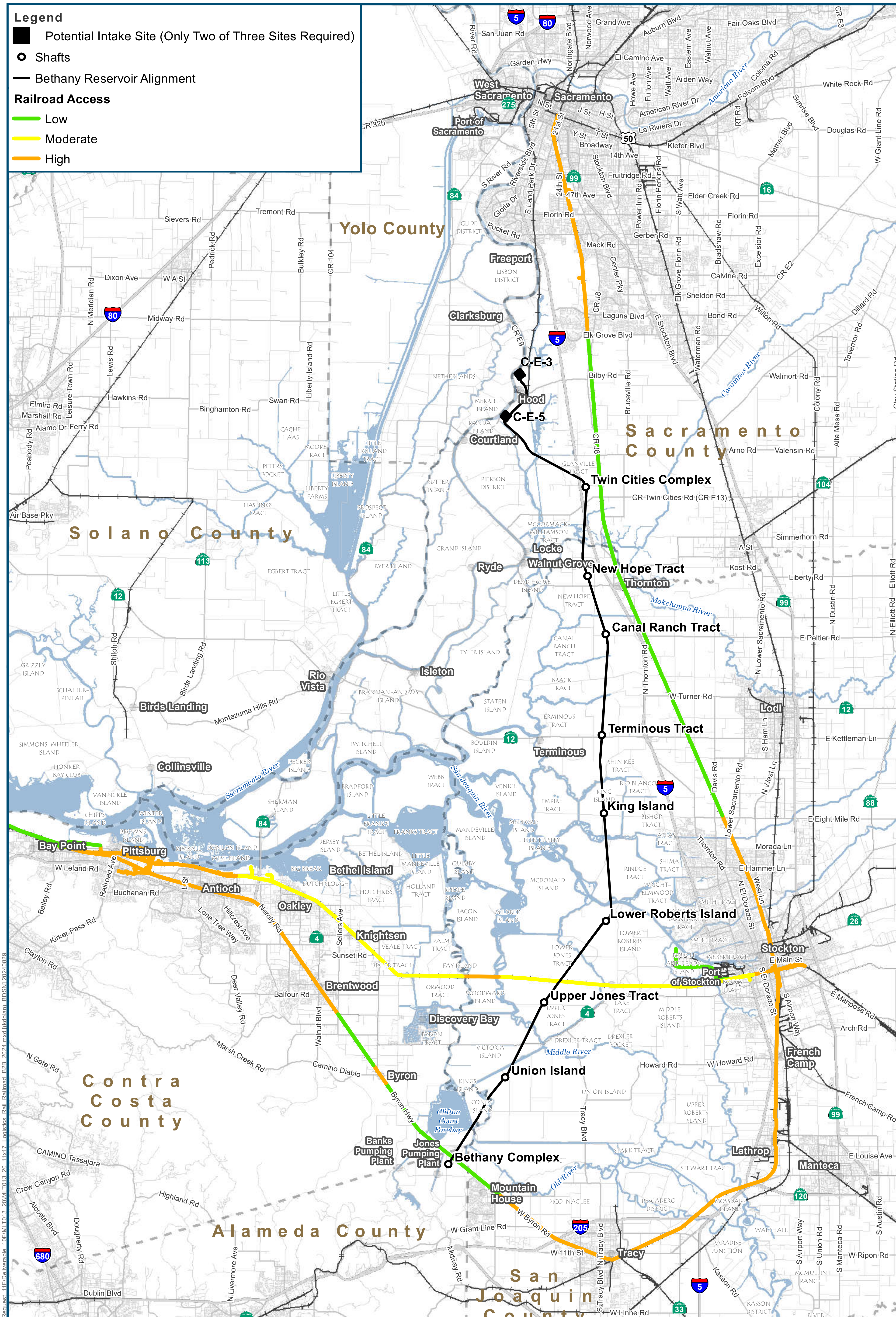
United States Environmental Protection Agency (EPA). 2020. Vehicles and Engines. Accessed February 8, 2020. https://www.epa.gov/vehicles-and-engines.

Attachment 1
Preliminary Conceptual Drawings and Technical Memoranda

The conceptual drawings and technical memoranda referenced below are preliminary and have not been fully developed, reviewed, or verified. The reader should expect to find some discrepancies and/or errors in these drawings. They should not be publicly disseminated without additional development and quality control. However, in spite of these limitations, the attached do illustrate the concepts described in this Template.

Attachment 1.A **Potential Rail Access Routes Map**

Attachment 1.B **Railcar Types**



For Illustration Purposes Only

0 2.25 4.5 Miles

Attachment 1.A

Proposed Rail Access Routes

Data Source: DCA, DWR

Attachment 1.B

RAIL CAR TYPES

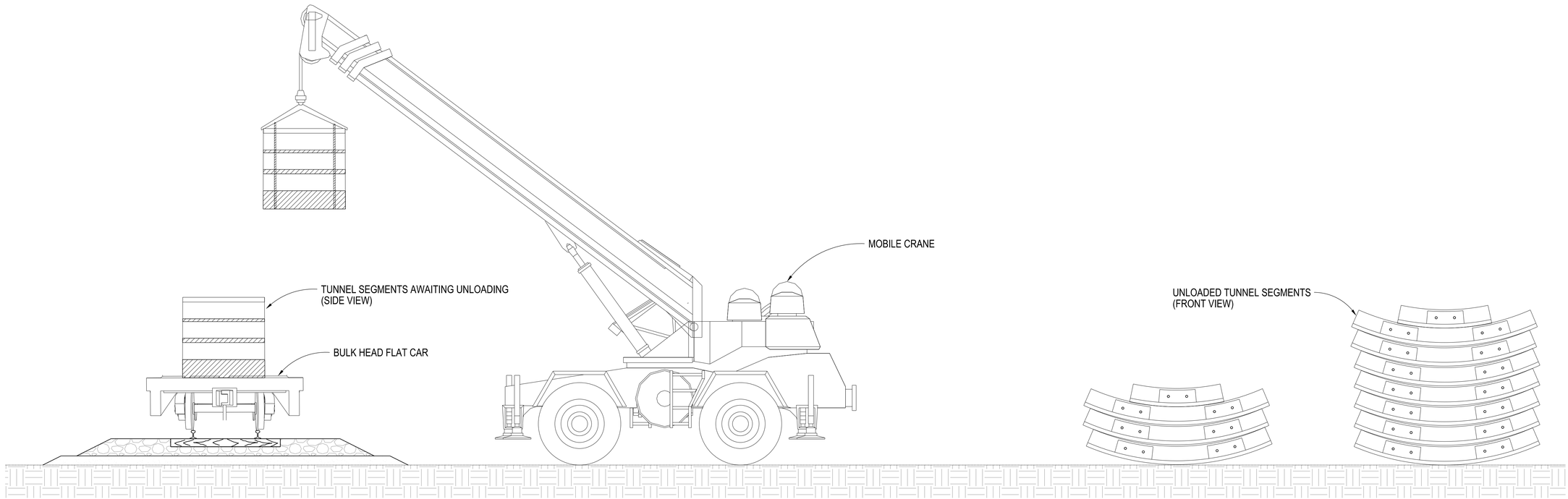
Attachment 1.B-1

TUNNEL SEGMENTS ON FLAT CAR

Source Google Images - Photo for Internal Reference Only

DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

JMA CIVIL



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TYPICAL SECTION-TUNNEL SEGMENT UNLOADING

SCALE 1" = 4'

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

REV	DATE	DESCRIPTION	SUB.	APPD

DESIGNED	APPROVAL RECOMMENDED
DRAWN: JK	APPROVAL BY
CHECKED: WG	

DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

DELTA CONVEYANCE PROJECT
CONCEPT ENGINEERING REPORT

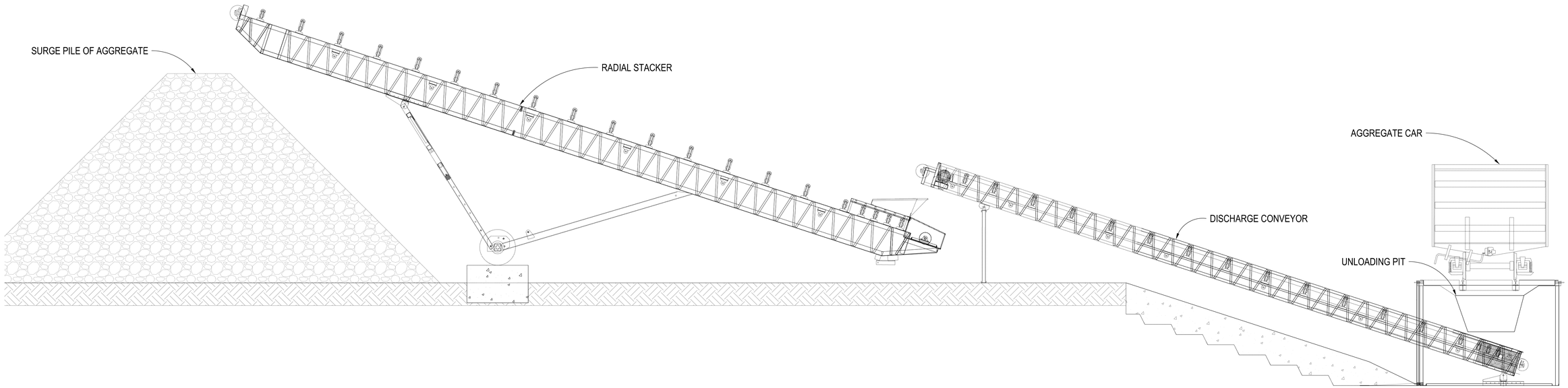
RAIL SERVED MATERIALS DEPOT
TYPICAL SECTION-TUNNEL SEGMENT UNLOADING

PROJECT NO.	
W8X97000	
SHEET NO.	
G-102	
REV	SEQUENCE NO.
	3

Attachment 1.B-2

AGGREGATES IN HOPPER CARS

Source Google Images - Photo for Internal Reference Only



D
X
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0 1"

REV	DATE	DESCRIPTION	SUB.	APPD

DESIGNED
DRAWN JK
CHECKED WG
APPROVAL RECOMMENDED
APPROVAL BY

DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

DELTA CONVEYANCE PROJECT
CONCEPT ENGINEERING REPORT

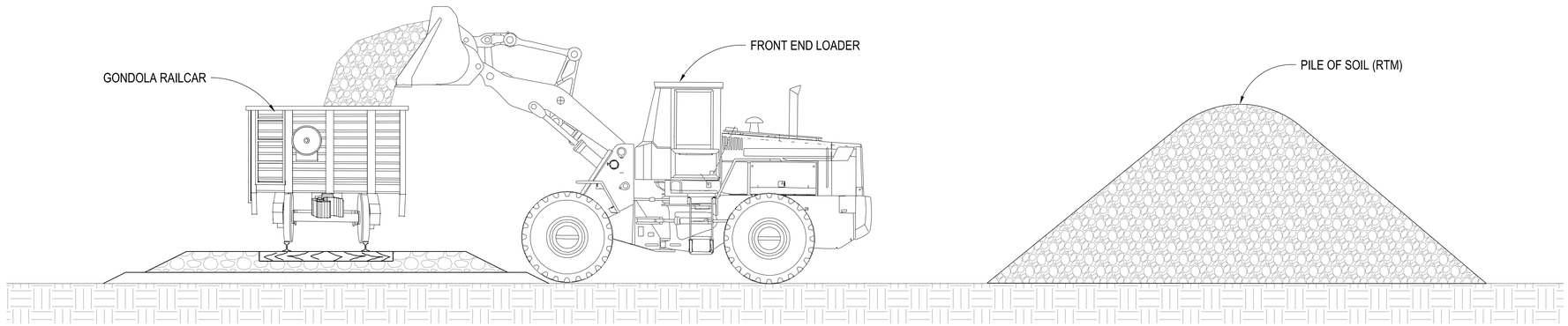
RAIL SERVED MATERIALS DEPOT
TYPICAL SECTION-AGGREGATE UNLOADING

PROJECT NO. W8X97000
SHEET NO. G-103
REV
SEQUENCE NO. 4

Attachment 1.B-3

SOIL IN GONDOLA CARS

Source Google Images - Photo for Internal Reference Only



X
X

TYPICAL SECTION-RTM LOADING

SCALE 1" = 4'

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

REV	DATE	DESCRIPTION	SUB.	APPD

DESIGNED

DRAWN JK

CHECKED WG

APPROVAL RECOMMENDED

APPROVAL BY

DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

DELTA CONVEYANCE PROJECT
CONCEPT ENGINEERING REPORT

RAIL SERVED MATERIALS DEPOT
TYPICAL SECTION-RTM LOADING

PROJECT NO. W8X97000

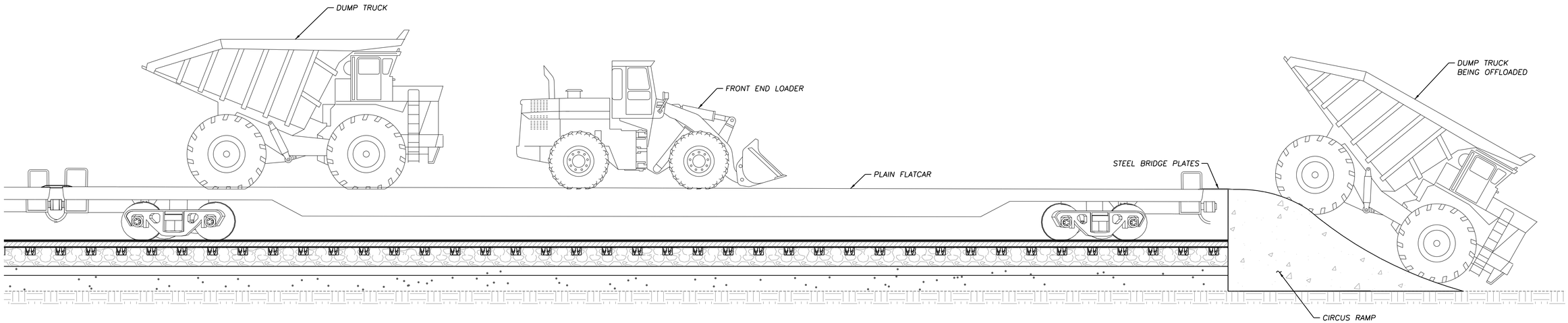
SHEET NO. G-101

REV | SEQUENCE NO. 2

Attachment 1.B-4

PROJECT EQUIPMENT FLAT CAR

Source Google Images - Photo for Internal Reference Only



X
X

TYPICAL SECTION - DUMP TRUCK OFFLOADING

SCALE 1"=4'

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

REV	DATE	DESCRIPTION	SUB.	APPD

DESIGNED
DRAWN
CHECKED
APPROVAL RECOMMENDED
APPROVAL BY

DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

DELTA CONVEYANCE PROJECT
CONCEPT ENGINEERING REPORT

RAIL SERVED MATERIALS DEPOT
TYPICAL SECTION-DUMP TRUCK UNLOADING

PROJECT NO.
W8X97000

SHEET NO.
G-105

REV

SEQUENCE NO.
6

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