Appendix A

Terms and Definitions

absolute signal — A wayside signal without a number plate that conveys authority for the movement of trains.

aerial structure — A bridge or elevated structure with a track deck designed to accommodate direct fixation or ballasted track.

alignment — The horizontal and vertical location of the track, street, or highway as described by curves and tangents.

ampere — A unit of electric current.

Amtrak — The national rail passenger service.

annealing — A metal softening process, based on heating and slow cooling.

anticlimber — A horizontally ribbed steel fabrication mounted at floor level at each end of a rail car, which, during collision, will interlock with the other vehicle's anticlimber and reduce the tendency of the vehicles to "telescope."

approach slab — A reinforced concrete slab located at the interface of ballasted track with direct fixation track, embedded track, or an open deck bridge to provide a transition between ballasted track and the types of track with significantly higher track modulus.

aspect (signal aspect) — The appearance of a fixed signal conveying an indication as viewed from the direction of an approaching vehicle; or, the appearance of a cab signal conveying an indication as viewed by an observer in the cab.

at-grade crossing — The crossing of a railway track and a vehicular roadway at the same elevation; they are conventionally constructed of timber, asphalt, rubber, or concrete.

audio frequency overlay (AFO) — Track circuits that utilize audio frequencies that overlay another track circuit to detect another vehicle; they are mainly used for highway grade-crossing warning systems.

automatic block signal system	A series of consecutive blocks governed by block signals, cab signals, or both, which are activated by a train or by certain conditions that affect block use.
automatic train dispatching (ATD)	A function of the Operations Control Center computer system in which train dispatching from all terminal points, including the yard, is automatically driven by the current system timetable.
automatic train protection (ATP)	The subsystem of the train control system that maintains safe vehicle operation through a combination of vehicle detection, vehicle separation, and interlocking and speed-limit requests and enforcement.
automatic train stop (ATS)	The system that automatically applies the brakes on a train if the engineer fails to respond to a signal when the train passes over an inductor. Inductors are typically placed at signals or speed restrictions.
backwater	Water held, or restricted from flowing, by a dam or other obstruction within a stream or channel.
ballast	An integral part of the track structure, generally composed of crushed stone in which ties are embedded and is essential to good maintenance of track surface and alignment. FRA Track Safety Standards stipulate that: "Unless it is otherwise structurally supported, all track must be supported by material which will: (1) transmit and distribute the load of the track and railroad rolling equipment to the subgrade; (2) restrain the track laterally, longitudinally, and vertically under dynamic loads imposed by railroad rolling equipment and thermal stress exerted by the rails; (3) provide adequate drainage for the track; (4) maintain proper track cross-level, surface, and alignment."
baseline stray current survey	A survey conducted during pre-construction in which soil and groundwater corrosive characteristics are determined. These data serve as a basis for corrosion control designs.

betterment

Betterment is defined as a replacement facility or any component thereof, or an enhancement to an existing facility, requested by an entity and agreed to by SCRRA (whether constructed by SCRRA or the entity), that increases the service capacity, capability, appearance, efficiency, or function, except that the following shall not be considered as Betterments:

(a) An upgrade which the parties mutually agree will be of direct and principal benefit to the construction or operation of a project.

(b) An upgrade resulting from compliance with the entity's applicable standards, provided, however, that any upgrade which exceeds such applicable entity standards shall be considered a "Betterment."

(c) Measures to mitigate environmental impacts identified in the Project's final Environmental Impact Report or Statement and which are mutually agreed to be a project responsibility; provided, however, that any upgrade beyond minimally applicable requirements shall be considered a "Betterment."

The term "Betterment" shall include any upgrade to a conflicting facility requested by the entity and agreed by SCRRA, in order to conform to revisions or additions to the entity's standards that SCRRA is not required to accept or which is not otherwise excluded from the definition of Betterment as set forth above. The term "Betterment" shall also include any new or upgraded facilities or portion thereof added to a replacement facility at the entity's request for the purpose of the improvement of facilities or services. A Betterment shall not be an entity's project. Betterments shall be entirely the financial obligation of the entity.

block

A length of track with defined limits set by the train control system design.

bond

An electrical or circuit connection made between rail ends.

braking requirement

A braking requirement reflects the maximum safe speed at any given point in the system based on the conditions of the systems.

cab signal

The automatic train protection speed limit as transmitted to the vehicle by the wayside equipment.

Caltrans

California Department of Transportation.

catenary

In electrified territory, an overhead contact system of one or more bare wires including contact wire, messenger wire, and the interconnecting hangers.

cathodic protection A means of limiting the electrochemical process of corrosion whereby: (1) corrosion is diverted from the item to be protected (the cathode) to a sacrificial item (the sacrificial anode), which eventually corrodes and must be replaced, or (2) an outside electrical current is applied to the item to be protected to control differences in electrical potential between the item (the cathode) and the soil (the anode).

central business district (CBD) The center or core within an embracing region in which the most intensive commercial activity is concentrated.

Centralized Traffic Control (CTC) A term applied to a system of railroad operation by means of which the movement of vehicles over routes and through blocks on a designated section of track or tracks is directed by signals controlled from a designated point without requiring the use of train orders and without the superiority of trains.

channelization The process of controlling automobile traffic by channeling vehicles into specific traffic lanes via barrier curbs and islands.

Also, a method for improving the flow capacity of waterway.

clearance envelope Distance in all directions around a train that must be kept clear of obstructions.

closure rails The rails between the parts of any special trackwork layout, such as the rails between the switch and the frog in a turnout; also, the rails connecting the frogs of a crossing or of the adjacent crossing, but not forming parts thereof.

coasting The mode of operation of a train in which propulsion (positive traction) and braking (negative traction) are inactive.

compound curve Track curve composed of more than one curve, each with a different curvature or radius.

compromise joint A joint matching two rails of different sections or sizes. The four bars for the two joints make up a set of compromise bars for two compromise joints (left & right).

compromise weld A welded joint matching two rails of different sections or sizes.

contact A conducting part which co-acts with another conducting part to open or close an electric circuit.

contact wire	Portion of the overhead power distribution system which comes into contact with the sliding current-collector strips on the pantograph, thus transferring electrical power to the train, usually a solid grooved wire.
continuous cab system	A cab system that provides speed commands and other data to the vehicles throughout the system.
continuous welded rail (CWR)	A number of shorter length rails welded together into a single length of generally 400 feet or greater.
contract documents	Engineering design documents, such as design drawings and specifications, incorporated into a composite package for the purpose of soliciting construction bids.
contractor	A person or entity who agrees to furnish materials or perform services at a specified price, especially for construction.
control operator	An employee assigned to operate CTC or interlocking control machine or authorized to grant track permits.
control point	A location of Absolute Signals controlled by a Control Operator.
control signal	A wayside train signal used to control the movement of trains at a control point; an Absolute Signal.
coupler	An appliance on a railroad car for coupling two vehicles.
creep	The tendency of materials to flow plastically due to increase in strain under sustained load.
crest curve	A convex vertical curve.
cross-bond	An electrical connection from one track to another track to distribute traction power return currents.
crossing diamond	Special trackwork installed to allow two tracks to cross at grade.
crossover (single)	Two turnouts, with track located between the frogs and arranged to form a continuous passage between two adjacent and generally parallel tracks.
crossover (double)	Two single crossovers which intersect each other between the two adjacent and generally parallel tracks forming a connection between them. Sometimes referred to as a “scissors” crossover or “diamond” crossover.

crossover (universal interlocking)	Two single crossovers not intersecting each other but adjacent, allowing passage from one track to another in either direction.
crosstie	The portion of the track structure that supports the rails and maintains gage. Ties are constructed of wood, concrete or steel and are usually spaced 18-24 inches at right angles to the rails.
culvert	A drainage structure or pipe crossing under a track or roadway.
curb return	The portion of a curb at which vehicles make sharp turns.
cut-out (train control)	A circuit at the exiting point of an automatic train control system or cab signal territory by means of which a vehicle ATP system is actuated so as to be in the street running or yard control condition.
Data Capture and Reporting System	A function of central control that records all change-of-state information and system transactions for analysis and reporting purposes. The data capture and reporting system will produce an audit trail listing all controls and indications, as well as how and when they were initiated.
derail	Mechanical device used to derail or otherwise direct rail vehicles away from adjoining or connecting tracks.
design criteria	A document whose purpose is to describe the engineering design criteria to be used during preliminary and final design.
design load	Load which includes stresses due to effective prestress after losses, dead loads, maximum specified live loads, and impact loads.
detector locking	Electric locking, effective while a vehicle occupies a given section of a route, which prevents operation of switch-and-lock movements within that section.
diagnostic team	A joint design team that develops the configuration for a new or upgraded public road crossing. The team includes representatives of the CPUC, the using railroads, the roadway owner, and other involved agencies such as fire, school, etc. SCRRA representatives are typically from the Public Projects and Signal Departments.
direct fixation	Type of track construction in which the rails are fastened to a concrete slab using fasteners which provide lateral and longitudinal restraint, electrical and vibration isolation, and allow for adjustment of the rail position as the rail wears.

direct reverse curves	Sequential and opposite track curves with no intermediate section of straight track (S-shaped curve).
dispatcher	Person stationed in the Operations Control Center who monitors and controls train operations on the main line of the rail system.
division	A portion of the SCRRA system, which is itself made up of subdivisions.
draft gear	The component integrating the coupler to the vehicle underframe anchorage. The draft gear is designed to absorb the shocks incidental to multi-vehicle movements and coupling of vehicles and thereby cushion the force of impact to minimize stresses imposed on the vehicle structure.
dual control switch machine	A power-operated switch machine that can also be thrown by hand.
dwarf signal	A low wayside signal.
dynamic braking	A system of electric braking in which the traction motors, when used as controlled generators, retard the vehicle.
dynamic vehicle outline	The lateral limits of a train in motion considering factors such as vehicle roll, side sway, and fishtailing.
easement	The right legally afforded a person or entity to make limited use of another person's real property as the right-of-way.
electric lock	A device to prevent the movement of a track switch unless the locking member is withdrawn by an electrical device such as an electromagnet, solenoid, or motor.
electromagnetic interference (EMI)	Electrical interference of communication signals caused by undesired electromagnetic energy within the atmosphere.
emergency load	An electrical load that is required to be energized from the emergency power source for a specific time interval after the loss of both normal and backup power.
equal construction	The process of constructing a new facility of the same type construction and capacity of existing facilities. Similar to replacement-in-kind.

essential load	An electrical load that is considered essential for safety and system operation so that interruption of power to these loads shall be held to a minimum time. This minimum time is the normal transfer time of automatic transfer equipment and the start time of standby generating equipment.
fail-safe	A device, system, or circuit that ensures that any malfunction affecting safety will cause the device, system, or controlled function of the circuit to revert to a state that is known to be safe.
feeder	An electrical conductor that connects a load or distribution point to its source of power.
field weld	A rail joint weld done in the field, typically using the thermite process.
fixed facilities	Facilities to be constructed as part of the project that are stationary (passenger stations, trackway, etc.) rather than mobile (rail vehicles).
flood storage capacity	The capacity of a drainageway to store, or significantly delay, runoff from a storm event to prevent “flash” flooding.
floodplain	Area within and adjacent to a watercourse that would be expected to be inundated (flooded) during a storm event of a particular frequency (e.g., a 100-year storm).
freight or other track	All tracks that are constructed and/or maintained by SCRRA for use by freight railroads to serve their industrial clients, not generally used by SCRRA passenger equipment.
friction braking	Vehicle braking method that uses brake pads to exert friction forces on a rotating wheel to stop that wheel from rotating.
frog	A track structure or device used at the intersection of two running rails to provide support for wheel treads and passageways for their flanges, thus permitting wheels traversing either rail to cross the other.
frog number	The number used to designate the size of a frog, and being equal to ratio length to divergence.
galvanic corrosion	The electrochemical process of corrosion caused by a difference in electrical potential between dissimilar metals, dissimilar soils, or metals and soils.

girder rail	Any one of several types of rail sections most commonly used in electric or street railway construction. Girder groove rails are asymmetrical rails which provide a wheel flangeway adjacent to the gauge side of the railhead. Girder guardrails use a similar flangeway, but with a raised lip, to provide a guarding action similar to that provided by a separate restraining rail.
graceful degradation (recovery)	An equipment failure in which the system will function with little ill effect. When the failure is resolved, recovery has little effect on other parts of the system.
ground return bonding	Bonding to prevent ground return current.
ground return current	Current that returns to the source through the ground, such as in a damp road crossing.
guard rail	An assembly in a turnout placed opposite the frog point to prevent wheel flanges from contacting the frog point. Also used on crossing frogs.
guarded track	Track with an additional component located inside one or both running rails to bear against the back of the wheels to guide them in traversing small radius curves.
headblock	The tie arrangement under the point of the switch to hold the switch machine and the connecting rods. There are usually two headblock ties.
headway	The time-separation between two trains, both traveling in the same direction on the same track. It is measured from the time the head-end of the leading train passes a given reference point to the time the head-end of the immediately following train passes the same reference point.
heel of frog	The end of the frog in the turnout farthest from the point.
hertz	A unit of measurement that measures alternating electricity by the number of cycles in one second.
high frequency inverter/ballast unit	Self-contained power supplies for fluorescent lamp fixtures that use a high frequency switching rate to produce ac from dc input.
highway-rail grade crossing	An intersection of a highway, road, or alley with railroad tracks at the same elevation.

highway-rail grade crossing warning device	A device that provides a visual and/or audible warning and restricts access to the intersection of a highway grade crossing.
horizontal curve	A track curve connecting two horizontal tangents of different bearing.
impedance bond	A metallic device of low resistance and relatively high reactance, used to provide continuous path for the return propulsion current around insulated joints and to confine the audio frequency signaling energy to its own track circuit.
insulated joint	A joint between adjoining rails in which electrical insulation is provided.
interlocking	An arrangement of signals and signal appliances interconnected so that their movements must succeed each other in proper sequence and for which interlocking rules are in effect. It may be operated automatically or by sections.
interlocking limits	The boundaries of an area of track controlled by an interlocking, as defined by the extreme opposing home signals of that interlocking.
intermittent block cab system	A cab system that provides speed commands to the vehicle at predetermined points.
inverter system	System dedicated to accepting primary dc power, changing it to ac voltages, single or multiple phases, as required.
jerk limit	Maximum rate of change of acceleration for a train. The normal units are feet per second cubed.
jointed rail	Running rail that is connected end to end by means of joint bars and bolts.
jumper cables	Electrical cables that provide electrical continuity in the overhead power distribution system at special trackwork and other locations where it is necessary to have mechanical separations between conductors.
junction box	Any enclosure in which electrical wires and cables are intersected or spliced.
kiss-and-ride	An access mode to a transit station that does not provide for long-term parking; the patron is brought to the station by private automobile, which departs after dropping off the patron.

last long tie	The last switch tie in a turnout farthest from the point.
leaky coaxial antenna	Slotted coaxial cable installed within the length of a tunnel that receives and distributes the rail operations and control radio signals; the cable allows operation of the radio channels while a train is in a tunnel.
light unit	An assembly of one or more lenses, roundels or reflectors, arranged in a suitable frame or case with fixture and electrical lamp or lamps from which a light beam or beams can be projected and controlled.
local control panel	A panel provided in each train control room for monitoring and control of their movement in a designated area. The control panel displays the track diagram of the designated area and provides associated control devices and indicators.
local section	Section control equipment located at the site of the mechanical or electrical process that is being controlled.
lock rod	Part of a track switch or derail that locks the switch points or derail into normal or reverse position; consists of a rod, attached to the front rod or log, through which a locking plunger may extend when points or derail are in the normal or reverse position.
long-term parking facilities	Parking facilities designed for vehicles parking for extended periods (i.e., greater than 15 minutes). Park-and-ride lots are designed as long-term parking facilities.
loop detector	Vehicle detection coil imbedded in the roadway or trackway that detects vehicles requiring entry into the system. Part of the traffic control system.
low chord/soffit	The lowest horizontal surface of any span, including truss, beam, concrete, and/or deck plate girder.
main track	A track extending through yards and between stations that must not be occupied without authority or protection.
mainline	A section of track on which trains move at design operating speed, primarily for the purpose of transporting patrons during revenue service.
master clock	A single clock provided for the purpose of synchronizing all computer subsystems with the time received from a common master time source.

Master Utility Relocation Agreement	An agreement between SCRRA and local utility companies that spells out the procedure, responsibility, and financial liability for any required utility relocations, replacements, or other utility work.
messenger wire	A suspended wire attached to primary structural supports, from which is suspended a cable or conductor. In a catenary system, the conductive messenger wire supports the contact wire through hangers.
Metrolink Operations Center	The operations control center for SCRRA, located in Pomona.
non-essential load	An electrical load of such a nature that interruption of power to it for a short period will not affect safety and system operation. Non-essential loads do not require a backup power source.
non-revenue track	See *secondary track*.
non-signaled territory	Sections of the track system in which no signals exist. The centralized traffic control system identifies all trains as they enter and exit non-signaled territory.
non-vital relays	Any relay that does not affect the safety of train operations.
ohm	An electrical unit that measures the resistance to the flow of current in a conductor.
omnibus backbone network	Electronic network that accommodates the data, voice, and closed circuit television transmission needs of the communications system and the voice and remote control connections to rail radio base stations.
operating rod	The rod through which motion is transmitted.
overhead contact system (OCS)	An electrical power distribution system designed to conduct and transfer power from substations to the trains. The system comprises the bare wire overhead contact system, supporting structures and their foundations, supporting attachments to overhead bridge structures, parallel insulated traction power supply cable hardware and connections to the overhead contact system, and cable cross arm supports and hardware for locations where aerial support is selected for the signal control and communications cables. A collapsible and adjustable frame that is mounted on top of a vehicle and to which a sliding current-collector shoe is fitted at the upper end.

park-and-ride	A transit access mode in which a patron drives a private automobile to a station, parks in the areas provided for that purpose, and enters the transit system.
patron	A person who paid fare to use the transportation service provided by SCRRA.
pocket track	A track located between two primary tracks, which is used to store out-of-service, layover, or turning back trains.
point detector rod	A rod through which position is transmitted to the circuit controller to indicate position of the switch points.
point of vertical curvature (PVC)	Point of connection of a tangent track line to a vertical curve.
point of vertical tangency (PVT)	Point of connection of a vertical curve to a tangent track line.
primary track	Track constructed for vehicles in revenue service (carrying revenue passengers), including mainline, siding, and station tracks.
profile	The vertical alignment of the track, usually shown as the top of rail elevation.
profile grade (grade line)	The datum line which defines the vertical alignment of the track, applied at the top of the low rail.
radio frequency interference (RFI)	Electrical interference of communication signals caused by undesired radio frequency energy within the atmosphere.
radio release	A reset command sent by radio communications to release the automatic trip stop (ATS) system.
rail anchor	A device attached to the rail that contacts the tie and prevents longitudinal rail movement.
rail clip	A resilient device used to secure running rails to crossties to provide vertical, lateral, and longitudinal restraint of the rail.
rail fastener	A device used to secure running rails to crossties to provide vertical and lateral restraint of the rail. This includes track spikes and resilient fasteners.
receiver	A device that converts electric energy input to the device to indicate electric energy is present.

receiver (track circuit)	Receiver so placed that upon detection of a voltage or frequency, a contact or voltage is supplied to controlling circuits to indicate its presence.
receiver (train control, cab control)	Receiver so placed that it is in a position to be influenced inductively or actuated by an automatic train stop, train control, or cab signal element.
redundancy	The existence in a system of more than one independent means of accomplishing a function.
regenerative braking	A system of electric braking in which the traction motors, when used as controlled generators, return a portion of the braking energy as electrical energy to the contact wire for use by other trains or other train subsystems.
relay	A device that is operated by a variation in the conditions of one electric circuit to affect the operation of other devices in the same or another electric circuit.
relay-based equipment	An electromagnetic device operated by a variation in the conditions of one electric circuit to affect the operation of other devices in the same or another electric current.
relay-based interlocking	(See *interlocking*.) Equipment used to control an interlock that consists primarily of relays.
replacement-in-kind	The process of replacing a facility with a facility of the same type, construction, and capacity. Similar to equal construction.
resistance-to-earth criteria	The design desirable in-service electrical resistance per mile of mainline running rails, special trackwork, and ancillary system connections.
revenue track	See *mainline* and *primary track*.
reverse running	The operation of a vehicle against the normal direction of operation on a particular track.
rheostatic brake	Braking in which the power generated by the traction motors, when driven as generators, is dissipated through a resistor bank. Also called dynamic braking.
right-of-way (ROW)	Land or rights to land used or held for railroad operations or for public way.

running rail	That rail upon which the tread of rolling stock wheels bear.
sacrificial anodes	An item, such as a zinc plate, that limits the electrochemical process of corrosion by diverting corrosion from the item to be protected (the cathode) to itself (the anode), which eventually corrodes and must be replaced.
safe braking distance (SBD)	The distance allowed for the safe stopping of a train from a given speed, or for reducing velocity from one speed to another speed. The SBD will include the distance traveled at the initial speed during operator and equipment reaction time, stopping distance, or distance required to reduce to the new speed desired, and an appropriate safety-factor.
sag curve	A vertical curve that is concave.
sand box	Timber box structure filled with sand and located at the ends of stub-end tracks to stop rail cars and minimize damage to them.
secondary track	All track that is not primary track; or, track constructed for the purpose of switching, storing, or maintaining vehicles that do not carry revenue passengers.
self-service fare collection	A proof-of-payment fare collection system.
shop track	Track which consists of all yard and secondary track constructed within the limits of the maintenance buildings.
short-term parking facilities	Parking facilities designed for vehicles parking for a limited time (i.e., less than 15 minutes). Kiss-and-ride lots are designed as short-term parking facilities.
signals (automatic)	A signal at the beginning of a signal block that automatically changes its aspect to indicate whether the block is clear or occupied.
signals (controlled)	A signal that requires a request for its operation, i.e., a signal that is not automatic.
signals (wayside)	A signal of fixed location along the track right-of-way.
simulation	The representation of the functioning or process of one system by means of another, especially when examining a problem not subject to direct experimentation.

slip	The act of train wheels sliding (rather than rolling) over the rails due to rapid deceleration of the train. Slip is detected and controlled by slip-spin protection.
special trackwork	A generic term referring to turnouts, single and double crossovers, track crossings, and other items that permit tracks to merge, diverge, or cross one another.
specific minimum yield stress (SMYS)	The minimum design pressure or stress at which a steel pipe will fail or yield.
speed	The maximum speed of operation for trains, often different for passenger and freight trains.
spin	The act of train wheels spinning (rather than rolling) over the rails due to rapid acceleration of the train. Spin is detected and controlled by slip-spin protection.
spiral curve	Curves that are used on mainline track alignments to transition from a tangent to a circular curve, and to develop the superelevation of the track.
stand-alone validator	A device available at stations to imprint information on riders' tickets for self-service fare collection verification.
static vehicle outline	The lateral limits of a vehicle body, not in motion, and with all mechanical features in nominal factory condition.
station	A facility equipped with platforms to enable patrons to enter and leave trains.
stock rail	A running rail against which a switch point operates.
stray currents	Electrical currents, other than those generated for use by the rail system, which exist in the environment due to the electromagnetic and/or electrochemical interactions of the rail equipment, atmosphere, groundwater, and soils.
stub-up	Portion of underground electrical conduit that rises to or through the ground surface.
sub-ballast	A material superior in composition to the roadbed material which provides a semi-impervious layer between the track ballast and the roadbed for better drainage and distribution of load to the roadbed.

subdivision Portion of the SCRRA system, such as the San Gabriel Subdivision.

subgrade The native material underneath a constructed railroad track, which is commonly compacted and stabilized before construction of the railroad track.

substation A facility containing electrical equipment which typically provides for the transformation of high transmission voltage electric power to one or more lower voltages for distribution of the electric power to consumers.

substructure The part of an aerial structure or bridge below the bridge seats, tops of piers, haunches of rigid frames, or below the springlines of arches. Backwalls and parapets of abutments and wingwalls of bridges shall be considered part of the substructures.

superelevation (Ea) Tilting or “banking” of the running surface of a roadway or trackway in areas of curved horizontal alignment, which permits vehicles to negotiate the curves at higher speeds than would be possible if the running surface were level.

superstructure The part of an aerial structure or bridge above the bridge seats, tops of piers, haunches of rigid frames, or above the springlines of arches, including the floor, and not including the substructure.

support equipment Equipment used together to provide the basis of subsistence for a complete system.

switch control An electrical circuit that directs the movement of a track switch.

switch machine A device used to operate a track switch; a switch and lock is one type of switch machine.

switch point The movable tapered rail of a split switch.

switch, point of The end of a switch point farthest from the frog.

switch, split A track switch consisting of two movable switch points.

switch stand A device next to the point of the switch that includes the switch lever mechanism.

switch tie Special crossties of varying length used under a turnout.

switch-and-lock A device which performs the three functions of unlocking, operating, and locking a track switch or derail.

system-wide elements	Facilities that are continuous across the entire SCRRA system such as signal and communication systems.
ticket-issuing machine	A device to issue single ride documents showing that the passenger has paid the fare.
tie	A long timber or concrete member on which ballasted track is constructed; also referred to as a crosstie.
tie plate	A steel plate installed between the rail and the crosstie to distribute the load and restraint lateral movement.
time of concentration	The travel time required for overland flow plus the travel time required for channel flow of stormwater from the most remote point of the drainage area to the point under consideration.
timing device	A device that provides a contact or closure data indicating that a preset time has elapsed from a predetermined condition.
toe of frog	The end of the frog closest to the switch points.
track circuit	An arrangement of electrical circuits and/or electronic equipment, including a length of the running rails, which permits detection of vehicles.
track circuit (ac)	A track circuit that uses ac voltage to the rails to detect vehicles in a block.
track circuit (AF)	A track circuit that uses audio frequency to detect vehicles in a block.
track circuit (digital)	A processor track circuit that provides a means to transmit data to a train from the rails.
track circuit (double rail)	An ac track circuit that uses both rails for vehicle detection and uses impedance bonds for propulsion return.
track circuit (PF)	An ac track circuit that uses the supplied ac for detection of vehicles. (PF power frequency).
track circuit (single rail PF) vehicle	A PF track circuit that uses one rail solely for detection.
track circuit boundaries	An area defined from the end point on the track circuit to the other end of the track circuit. (See *block*.)
track crossing	The point at which two running rails cross.

track detection	A device detecting the presence of a vehicle that is used by the signal system for controlling train operation.
track, direct fixation	Track constructed of rail and rail fasteners attached by means of anchor bolts to a concrete trackbed.
track, embedded	Track constructed of rails and steel ties on a reinforced concrete slab and, except for the flangeways, embedded in asphalt or concrete to the top of rail to facilitate pedestrian or vehicle traffic over the tracks. For track located in streets, grade crossing, or vehicle maintenance facilities.
track gauge	The distance between the inside faces of running rails of a track measured at a point ⅝ in. below the top of rail. Standard gauge is 56 ½ inches.
traction current return	The path followed by traction power electrical current from the train back to the substation.
traction power	Power used by the train for propulsion.
train	Locomotive and one or more vehicles coupled together (a consist) and acting as a single unit.
train stop	A device used by the signal system to command a train to stop.
train stop (inductive)	An automatic train stop which uses electric coils as a means to command a train to stop.
train to wayside (TTW) system	A system that routes trains to their scheduled destinations and provides central control with vehicle identification.
Transit Communications Interface Protocols	Standards developed by the Institute of Electrical and Electronics Engineers and subsequently maintained by the American Public Transit Association, defining communications protocols to be used in the transit industry.
transition length	The portion of a tangent track in which superelevation is developed immediately preceding a circular curve and removed immediately following a circular curve, when spiral curves are not used.
transmitter	A device that generates electrical energy to be used by a receiver.
transponder	A device located on the track side that transmits data and/or receives data.

tunnel	An underground guideway constructed by methods such as soft ground tunneling, mixed face tunneling, or other means of boring into soil strata.
turnout	An arrangement of a switch and a frog with stock rails and closure rails that enables rail vehicles to be diverted from one track to another.
ultimate load	The load that causes failure of a structure with a single static application.
unbalanced superelevation	Occurs when trains operate at speeds higher than equilibrium or balanced speeds. The speed greater than equilibrium is expressed as an additional, imaginary, portion of the total superelevation. It is not actually built into the track.
uninterruptible power supply (UPS)	A battery power backup for the operation of critical signal and communications systems.
vending equipment interface	A specification for communication between elements of a fare vending system.
vertical curve	A parabolic curve connecting two vertical tangents in a track profile.
vital processor unit	A device in which a central processing unit provides a logical evaluation of predefined commands to determine an output. This device is designed to insure any failure conditions will provide no voltage, or zero data, to an output used for controlling circuits. (See *processor-based equipment*.)
vital relays	Relays that contain circuits that affect the safety of train operations.
volt	The unit of electromotive force, or that difference of potential that, when steadily applied against a resistance of one ohm, will produce a current of one ampere.
wayside	A term generally used to refer to the area alongside the path of a rail vehicle, but clear of its dynamic outline.
yard track	Secondary track constructed and operated for the purpose of storing, maintaining, or switching locomotive equipment or rail cars.
yardmaster	Person stationed at central control who coordinates all moves into or out of the yard.

Appendix B

Abbreviations and Acronyms

A	ampere
AA	Aluminum Association
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ABS	automatic block signal
AC/ac	alternating current
ACGIH	American Conference of Governmental Industrial Hygienists
ACHP	Advisory Council on Historic Preservation
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADU	aspect display unit
AF	audio frequency
AFBMA	Anti-Friction Bearings Manufacturers' Association
AFI	Air Filter Institute
AFO	audio frequency overlay
AGC	automatic-gain control
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Moving Control Association, Inc
AMTOR	above mean top of rail
ANSI	American National Standards Institute
API	American Petroleum Institute
APTA	American Public Transit Association
APWA	American Public Works Association
AREMA	American Railway Engineering and Maintenance-of-Way Association

ARS	acceleration response spectra
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPRS	American Society of Photogrammetry and Remote Sensing
ASQC	American Society for Quality Control
ASTM	American Society for Testing and Materials
A.T.	automatically tensioned
ATCS	Advanced Train Control System
ATD	automatic train dispatching
ATP	automatic train protection
ATS	automatic train stop (sometimes automatic trip stop)
AVAS	Automatic Voice Announcement System
AWG	American Wire Gauge
AWO	empty car operating weight
AW1	seated load car weight
AW2	normal load car weight
AW3	crush load car weight
AWS	American Welding Society
AWWA	American Water Works Association
B	bus
BIH	Bureau International de l'Heuer
BOCA	Building Officials and Code Administrators
BNSF	BNSF Railway Company
BPS	bits per second
BTS-84	Bureau International de l'Heuer (BIH) terrestrial system of 1984
BWA	balance weight anchor
C	Celsius
C&S	Communications and Signals

CA	California
CADD	Computer Aided Drafting and Design
Cal/OSHA	State of California Division of Occupational Safety and Health
Caltrans	California Department of Transportation
CBC	California Building Code
CBD	central business district
CC	center of curve
CCC	California Coastal Commission
CCD	charge-couple device
C.C.R.	California Code of Regulations
CCS	California Coordinate System
CCTV	closed circuit television
CDF	California Department of Forestry
CDFG	California Department of Fish and Game
CDRL	Contract Document Requirements List
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CF	centrifugal force
CFR	Code of Federal Regulations
CGS	California Geological Survey
CIDH	Cast-in-Drilled Hole
CIH	central instrument house
CIS	Customer Information System
CMF	Central Maintenance Facility
CORS	Continuously Operating Reference Stations
COTS	commercial off-the-shelf
CPM	Capital Program Management
CPTED	Crime Prevention through Environmental Design
CPUC	California Public Utilities Commission

CS	curve to spiral
CSB	client-server based
CSI	Construction Specifications Institute
CSM	Caltrans Surveys Manual
CSRS	California Spatial Reference System
CTC	centralized traffic control
CTS	Carrier Transmission System
CWH	contact wire height
CWR	continuous welded rail
CZMP	coastal zone management program
dB	decibels
dBA	decibel A-weighted sound level
DBE	Design Basis Earthquake
dc	direct current
DCM	Design Criteria Manual
DCRS	Data collection and Reporting system
DIDW	double inlet, double width
DoD	United States Department of Defense
DOT	Department of Transportation (U.S.)
DPG	Deck Plate Girder
DTM	digital terrain model
DVM	debit validator machine
E_a	actual (active) superelevation
E_t	total superelevation
E_u	unbalanced superelevation, or cant deficiency
EEPROM	Erasable electronically programmable read-only memory
EIA	Electronic Industries Association
EMI	electromagnetic interference
EMP	emergency management panel

EPA	Environmental Protection Agency
EPROM	Electronically programmable read-only memory
ES	Engineering Standards (SCRRA standard drawings)
ESA	Endangered Species Act
F	Fahrenheit
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FFTVM	full-function ticket vending machine
FGCS	Federal Geodetic Control Subcommittee
FHWA	Federal Highway Administration
FMVSS	Federal Motor Vehicle Safety Standards
FONSI	Finding of No Significant Impact
FRA	Federal Railroad Administration
FRE	fiberglass-reinforced epoxy
FRP	fiberglass reinforced plastic
FS	Factor of Safety
F.T.	fixed termination
ft	foot, feet
FTA	Federal Transit Administration
g	gram, or acceleration due to gravity
GCOR	General Code of Operating Rules
GDM	Graphic Design Management system
GEC	General Engineering Consultant
GO	General Order
GPS	global positioning system
GRS	Geodetic Reference System
H	horizontal
HARN	High Accuracy Reference Network

HDM	Highway Design Manual (Caltrans)
HDPE	high-density polyethylene
HDS	Hydraulic Design Series
HEC	Hydraulic Engineering Circular
HEP	Head End Power
HEPA	high efficiency particulate air
HGCWS	Highway Grade Crossing Warning system
HID	high-intensity discharge (lighting)
HMA	hot-mix asphalt
HMAC	hot-mix asphalt concrete
HP	horsepower
HVAC	heating, ventilation, and cooling
HWTR MT	hardwood-treated main track
Hz	hertz; one hertz = one cycle per second
ICEA	Insulated Cable Engineers Association
ICS	Independently Controlled Switch
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IEMF	Inland Empire Maintenance Facility
IEOC	Inland Empire-Orange County
IES	Illuminating Engineering Society
IGLD	International Great Lakes Datum
IJ	insulated joint
in.	inch, inches
I/O	input/output
IP	Individual Permit
IPCEA	Insulated Power Cable Engineers Association
ISO	International Standards Organization
JPA	Joint Powers Authority

kg	kilogram
km	kilometer
kN	kilonewton
kV	kilovolt
kVA	kilovolt ampere
kW	kilowatt
L	liter
L_s	length of spiral
LACMTA	Los Angeles County Metropolitan Transportation Authority
LAHT	low-alloy high-tensile
LCD	liquid crystal display
LCP	local control panel or local coastal plan
LED	light-emitting diode
Leq	equivalent noise levels
LF	longitudinal force
LFTVM	limited-function ticket vending machine
LRFD	Load and Resistance Factor Design
LVC	length of vertical curve
m	meter
M	magnitude of earthquake
mA	milliampere
MAS	maximum authorized line speed
max.	maximum
MCE	Maximum Credible Earthquake
MED	maximum expected discharge
METRO	Los Angeles County Metropolitan Transportation Authority
MIL	Military Specification
min.	minimum
MIS	Management Information system

mm	millimeter
MOA	Memorandum of Agreement
MOC	Metrolink Operations Center
MOU	Memorandum of Understanding
MOW	maintenance of way
MP	milepost
MPa	megapascal
MPA	midpoint anchor
mph	miles per hour
MSCP	Multiple Species Conservation Plan
MSE	Mechanically Stabilized Earth
MTBF	mean time between failures
MTTR	mean time to restore
MTTV	multi-trip ticket validator
MUTCD	Manual of Uniform Traffic Control Devices
MVA	megavolt ampere
NAD 83	North American Datum of 1983
NAPF	National Association of Pipe Fabricators
NAVD 88	North American Vertical Datum of 1988
NCCP	Natural Community Conservation Plan
NCTD	North County Transit District
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NGS	National Geodetic Survey
NGVD 29	National Geodetic Vertical Datum of 1929

NHL	National Historic Landmarks
NHPA	National Historic Preservation Act
NMAS	National Map Accuracy Standards
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NRPC	National Railroad Passenger Corporation (Amtrak)
NSRS	National Spatial Reference System
NWP	Nationwide Permit
o.c.	on center
OCC	Operations Control Center
OCS	overhead contact system
OCTA	Orange County Transportation Authority
OSHA	Occupational Safety and Health Administration
OTM	other track material
P	passenger automobile
Pa	Pascal
PA	public address
PA/CMS	public address/changeable message sign
PBA	peak bedrock acceleration
PC	point of curvature
PCA	Portland Cement Association
PCB	printed circuit board
PCN	preconstruction notification
PF	power frequency
PGA	Peak Ground Acceleration
pH	the measure of acidity or alkalinity of a solution, measured on a scale from 0 to 14 with 0 = acid, 7 = neutral, and 14 = alkaline
PI	point of intersection

PIVC	point of intersection vertical curve
PLC	programmable logic controller
ppm	parts per million
PT	point of tangency
PTC	Positive Train Control
PTT	push-to-talk
PTZ	pan, tilt and zoom
PVC	polyvinyl chloride, or point of vertical curvature (trackwork)
PVT	point of vertical tangency
QA/QC	Quality Assurance/Quality Control
RBM	rail-bound manganese
RCES	Rail Crossings Engineering Section
RCTC	Riverside County Transportation Commission
RDBMS	relational database management system
RE	designation of AREMA standard rail end section
RF	radio frequency
RFI	radio frequency interference
RGP	Regional General Permit
RMS	root-mean-squared
RMSE	root mean square error
ROF	random oriented fiber
ROW	right-of-way
rpm	revolutions per minute
RTK	real-time kinematic
RTU	remote terminal unit
RWP	Roadway Worker Protection
RWQCB	Regional Water Quality Control Board
RX	receive
SAE	Society of Automotive Engineers

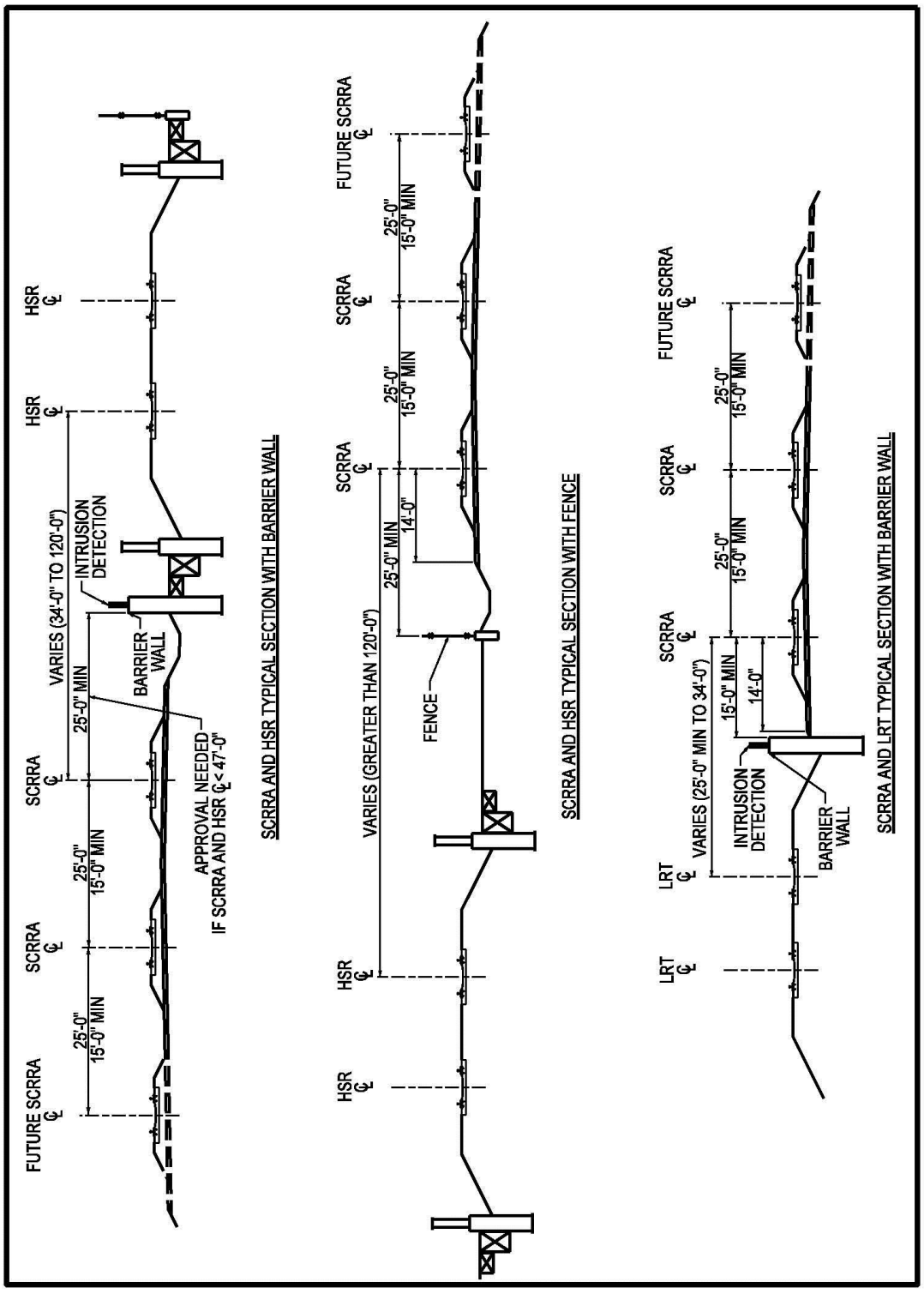
SANBAG	San Bernardino Associated Governments
SAV	stand-alone validators
SBD	safe braking distance
SC	spiral to curve
SCADA	supervisory control and data acquisition
SCAG	Southern California Association of Governments
SCRRA	Southern California Regional Rail Authority
SDC	Seismic Design Criteria
SGSM	self-guarded solid manganese
SHPO	State Historic Preservation Office
SIC	structure importance classification
SIP	State Implementation Plan
SISW	single inlet, single width
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMYS	specific minimum yield stress
SONET	Synchronous Optical Network
SOPs	Standard Operating Procedures
SPI	spiral point of intersection
sq. mi.	square mile
SSFC	self-service fare collection
SSPC	Steel Structures Painting Council
ST	spiral to tangent
STB	Surface Transportation Board
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TCE	temporary construction easements
TCIP	Transit Communications Interface Protocols
TIA	Telecommunications Industry Association
TIM	ticket-issuing machines

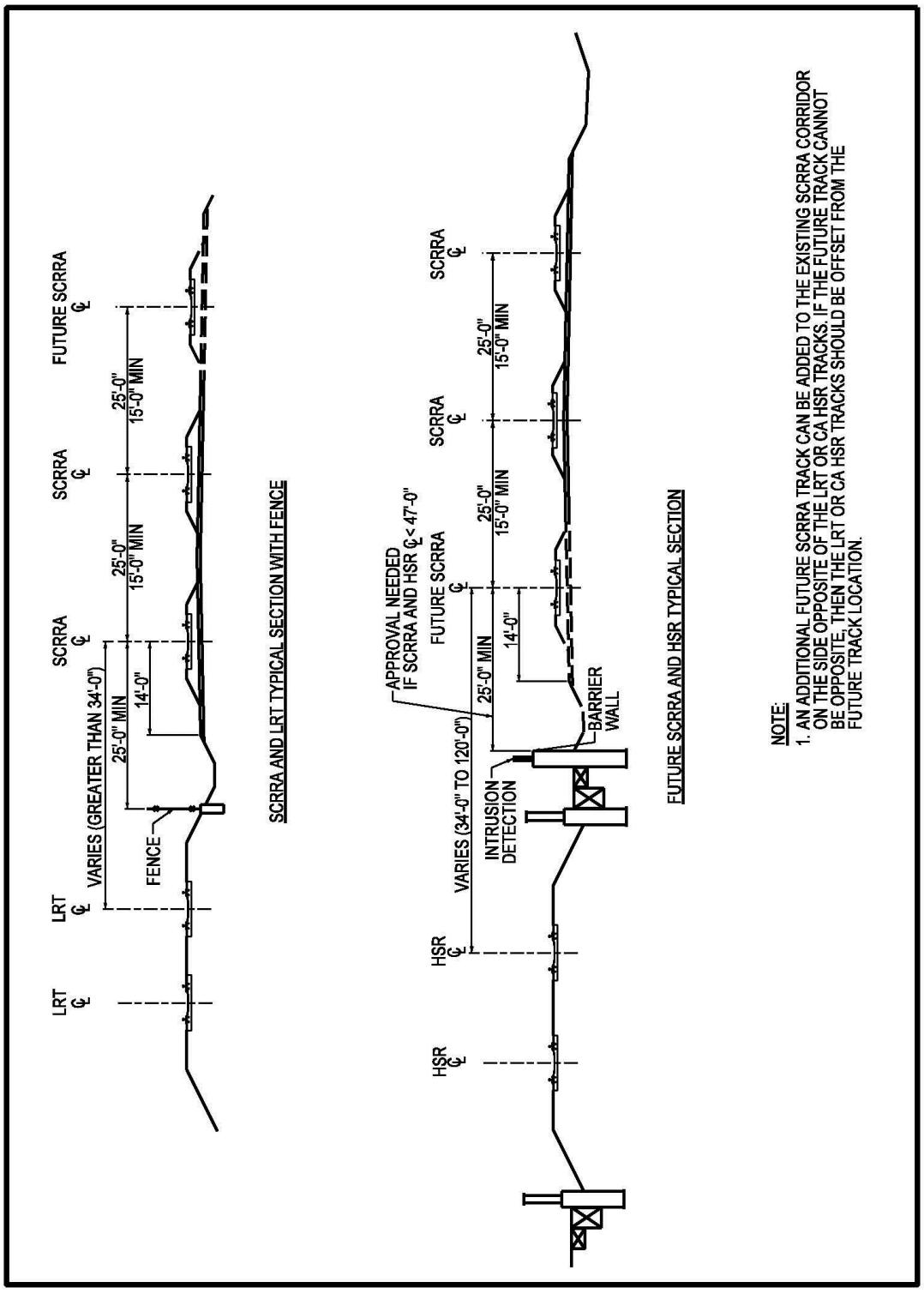
TIN	triangulated irregular network
TPG	Through-Plate Girder
TPOB	Tons per Operative Brake
T/R	top of rail
TS	tangent to spiral
TSSS	Total Station Survey System
TTTVM	ten-trip ticket validator machine
TTW	Train To Wayside
TVM	ticket vending machine
TWC	Train to Wayside Communication, also Track Warrant Control
TX	transmit
UBC	Uniform Building Code
UBE	Upper Bound Earthquake
UL	Underwriters' Laboratories, Inc.
UMTA	Urban Mass Transportation Administration (now known as Federal Transit Administration (FTA)
UP	Union Pacific Railroad
UPS	uninterruptible power supply
USACE	United States Army Corps of Engineers
USC	United States Code
USCG	Unites States Coast Guard
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
V	velocity or vertical or Volt
VCS	Voice Communication system
VCTC	Ventura County Transportation Commission
VdB	vibration decibel
Vdc	volts direct current

VEI	vending equipment interface
VMS	Variable Message Sign
W	watt
WATCH	Work Area Traffic Control Handbook
w.g.	water gauge
WGS	World Geodetic System
WQCB	Water Quality Control Board
WSM	wing rail spring manganese

Appendix C

SCRRA Shared Corridor Typical Sections


FUTURE SCRRA ℄
SCRRA ℄
HSR ℄
HSR ℄
VARIES (34'-0" TO 120'-0")
INTRUSION DETECTION
25'-0" MIN
BARRIER WALL
APPROVAL NEEDED IF SCRRA AND HSR ℄ < 47'-0"
25'-0" MIN
15'-0" MIN
25'-0" MIN
15'-0" MIN
SCRRA AND HSR TYPICAL SECTION WITH BARRIER WALL
FUTURE SCRRA ℄
SCRRA ℄
HSR ℄
HSR ℄
VARIES (GREATER THAN 120'-0")
25'-0" MIN
14'-0"
25'-0" MIN
15'-0" MIN
FENCE
SCRRA AND HSR TYPICAL SECTION WITH FENCE
FUTURE SCRRA ℄
SCRRA ℄
LRT ℄
LRT ℄
VARIES (25'-0" MIN TO 34'-0")
INTRUSION DETECTION
15'-0" MIN
14'-0"
25'-0" MIN
15'-0" MIN
25'-0" MIN
15'-0" MIN
BARRIER WALL
SCRRA AND LRT TYPICAL SECTION WITH BARRIER WALL

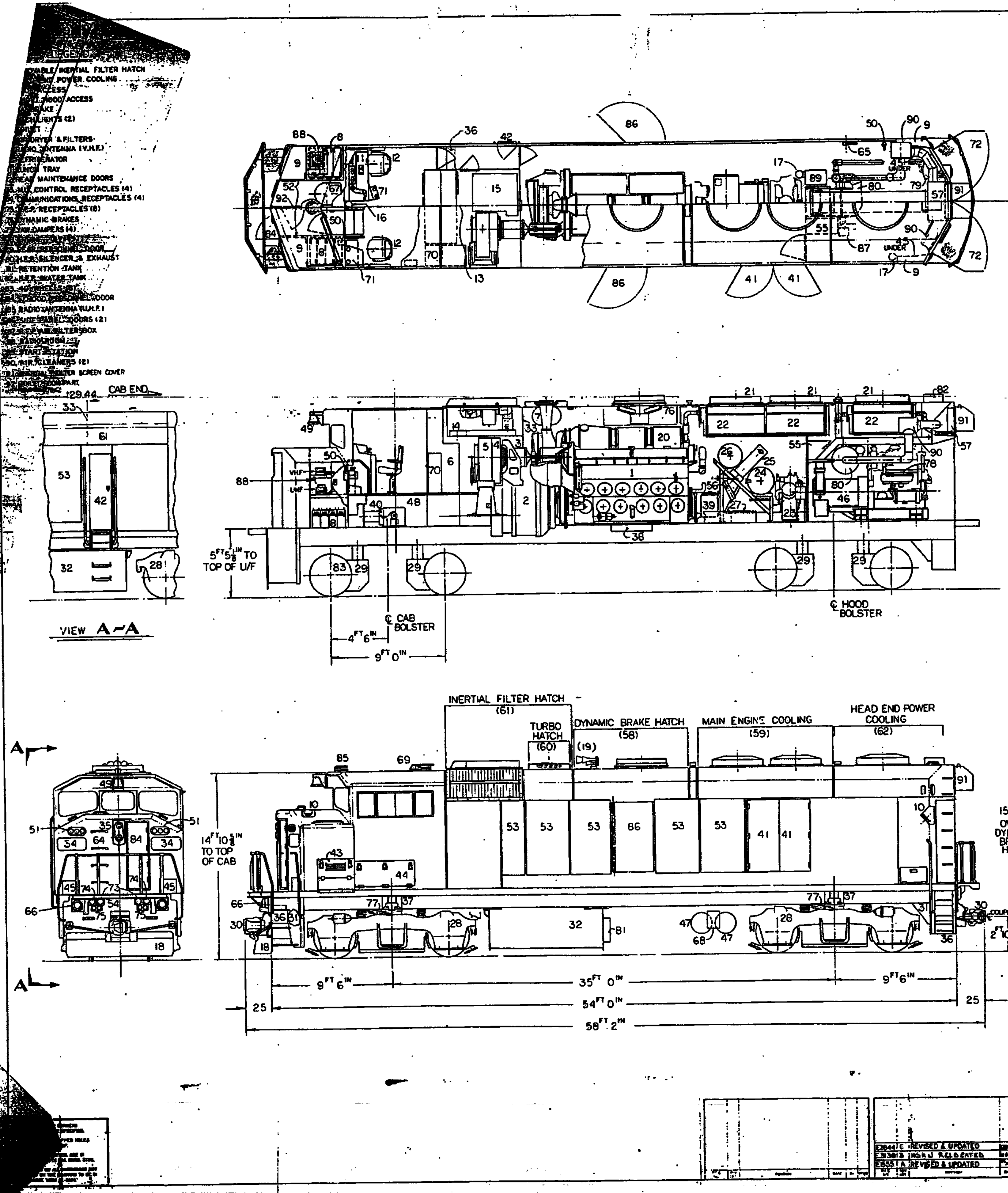

LRT ℄
LRT ℄
VARIES (GREATER THAN 34'-0")
25'-0" MIN
FENCE
SCRRA ℄
14'-0"
SCRRA ℄
25'-0"
15'-0" MIN
SCRRA ℄
25'-0"
15'-0" MIN
FUTURE SCRRA ℄
SCRRA AND LRT TYPICAL SECTION WITH FENCE
HSR ℄
HSR ℄
VARIES (34'-0" TO 120'-0")
APPROVAL NEEDED
IF SCRRA AND HSR ℄ < 47'-0"
25'-0" MIN
INTRUSION
DETECTION
FUTURE SCRRA ℄
14'-0"
SCRRA ℄
25'-0"
15'-0" MIN
SCRRA ℄
25'-0"
15'-0" MIN
SCRRA ℄
BARRIER
WALL
FUTURE SCRRA AND HSR TYPICAL SECTION
NOTE:
1. AN ADDITIONAL FUTURE SCRRA TRACK CAN BE ADDED TO THE EXISTING SCRRA CORRIDOR ON THE SIDE OPPOSITE OF THE LRT OR CA HSR TRACKS. IF THE FUTURE TRACK CANNOT BE OPPOSITE, THEN THE LRT OR CA HSR TRACKS SHOULD BE OFFSET FROM THE FUTURE TRACK LOCATION.

Appendix D

Manufacturer's Drawings of Locomotives and Cars

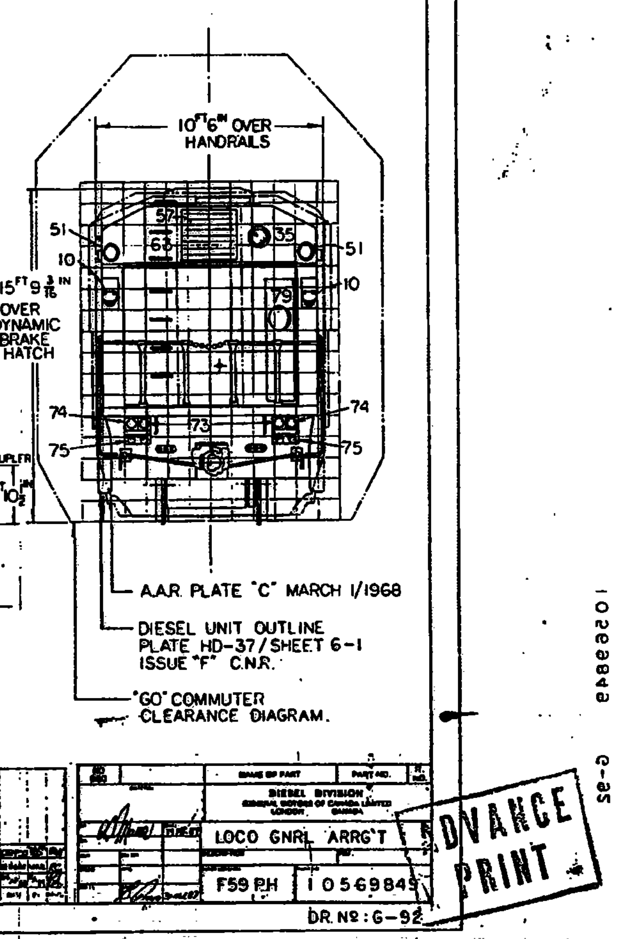
The following manufacturer's drawings are included in this appendix:

- Model F59PH
- Model F59PHI
- Model MP36PH-3C
- Bombardier Cars
- Rotem Cars



LEGEND

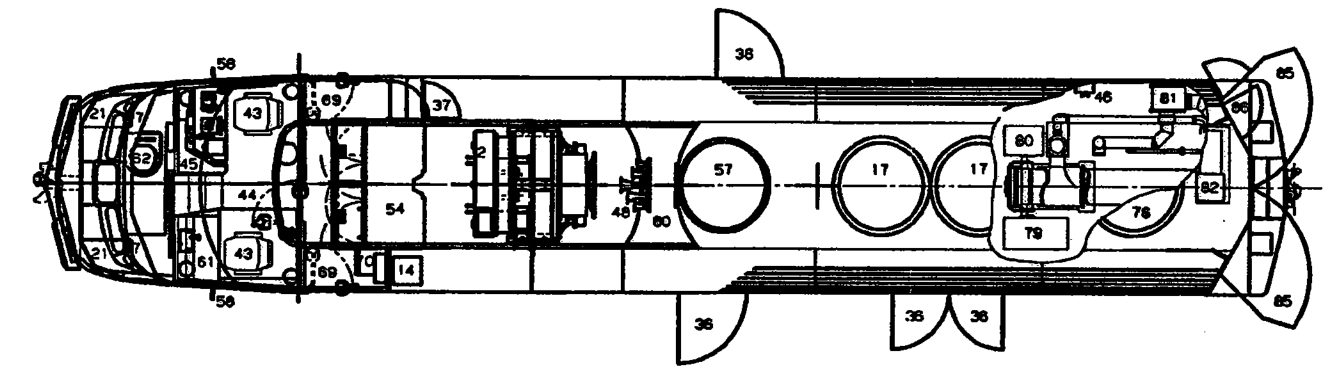
1. ENGINE – 12-710G3
2. GENERATOR/ALTERNATOR-AR-15WBC–D18A
3. AUXILIARY GENERATOR – 18 K.W.
4. GENERATOR/ALTERNATOR BLOWER
5. TRACTION MOTOR BLOWER
6. ELECTRICAL CONTROL CABINET
7. ENGINE EXHAUST SILENCER
8. BATTERIES – LEAD/ACID
9. SAND BOX (4)
10. SAND BOX FILLER
11. ENGINEER'S CONTROL CONTROL
12. CAB SEATS (2)
13. ELECTRICAL CABINET AIR FILTER
14. INERTIAL FILTER
15. ENGINE AIR FILTERS
16. FIRE EXTINGUISHER – CAB MOUNTED
17. FIRE EXTINGUISHER – ENGINE ROOM MOUNTED (2)
18. PILOT
19. HORN – K5LA
20. EXHAUST MANIFOLD
21. RADIATOR COOLING FANS
22. RADIATORS
23. AIR COMPRESSOR –
24. LUBE OIL FILTER
25. LUBE OIL COOLER
26. ENGINE WATER TANK MAIN(ENGINE)
27. TRACTION MOTOR AIR DUCT
28. TRUCKS – GP SINGLE SHOE
29. TRACTION MOTOR – D87B
30. COUPLER – TYPE "H"
31. DRAFT GEAR – NC 390
32. FUEL TANK – 1500 IMP GAL
33. ENGINE ROOM PARTITION
34. NUMBER BOXS (2)
35. HEADLIGHT
36. STEPS
37. JACKING PADS
38. OIL PAN
39. LUBE OIL STRAINER
40. ELECTRIC CAB HEATER
41. MAINTENANCE DOORS (2)
42. PERSONNEL/EMERGENCY DOOR
43. BATTERY ACCESS
44. SUB BASE ACCESS DOORS (2)
45. SAND TRAP ACCESS
46. 500 KW/ 575 V AC HEAD END POWER GENERATOR
47. MAIN AIR RESERVOIRS (2)
48. AIR BRAKE EQUIPMENT (LUL)
49. BELL
50. EMERGENCY BRAKE VALVES (2)
51. CLASSIFICATION LIGHTS
52. COLLISION POSTS
53. SIDE PANELS
54. ANTI-CLIMBER, CAB END
55. HEAD END POWER CONTROL CABINET
56. FUEL FILTER
57. INERTIAL FILTER, H.E.P.
58. REMOVABLE DYNAMIC BRAKE HATCH
59. REMOVABLE MAIN ENGINE COOLING HATCH
60. REMOVABLE TURBO-EXHAUST SILENCER HATCH

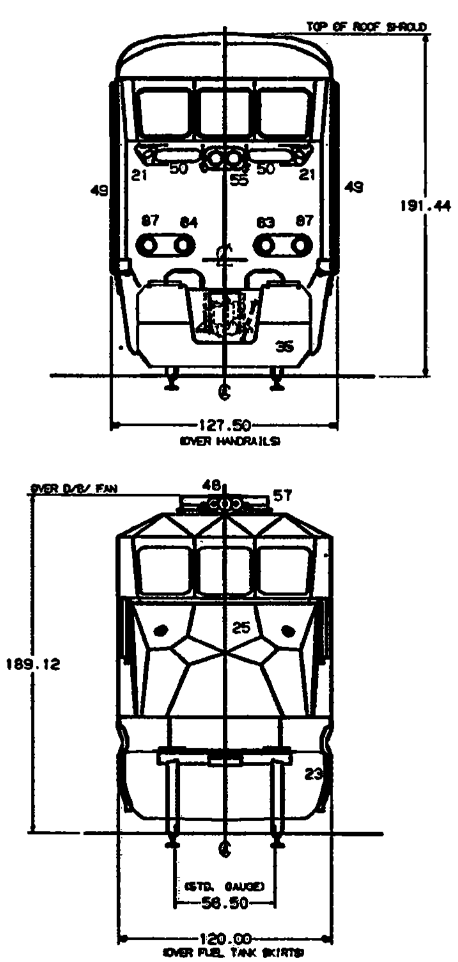


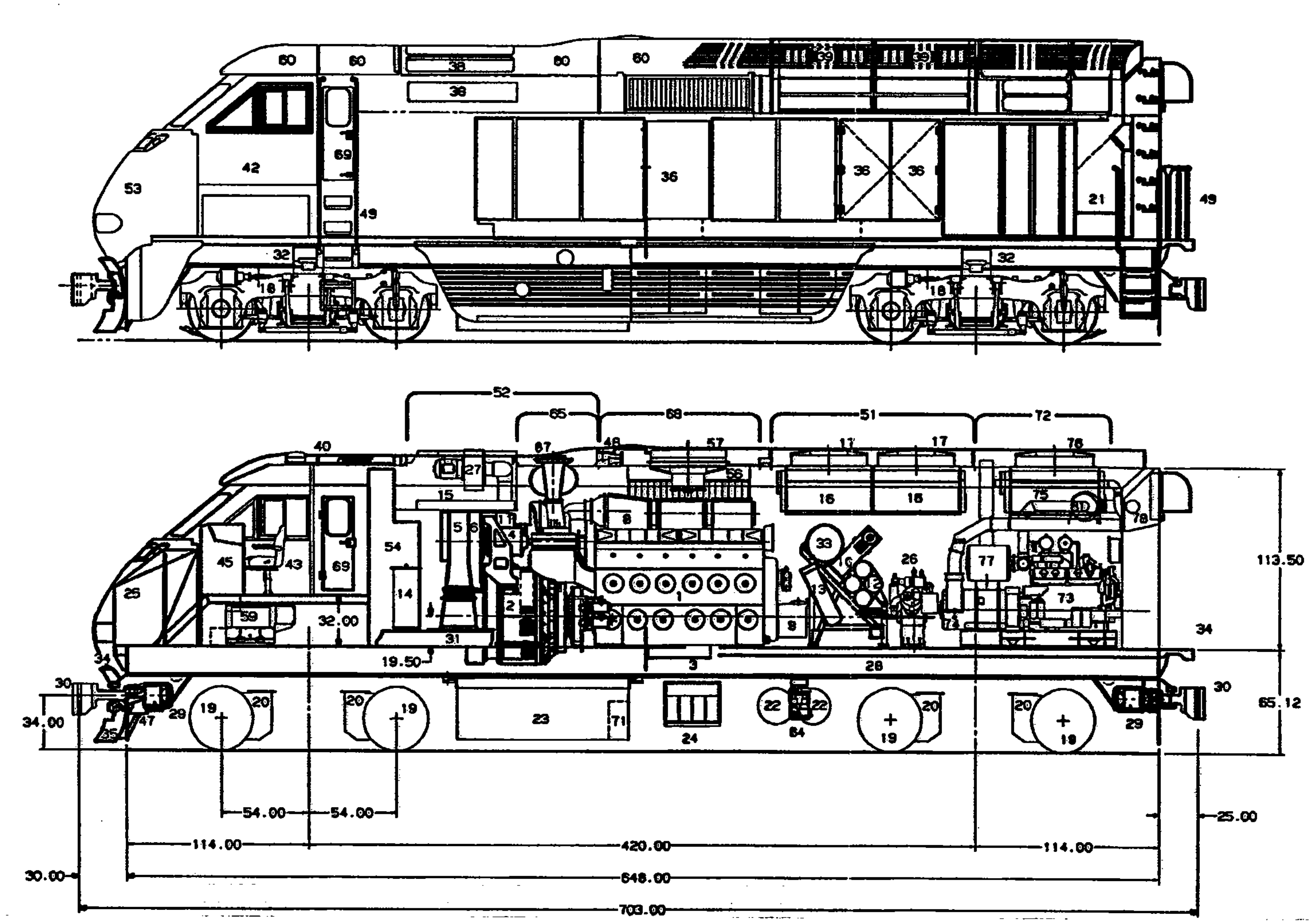
10643846

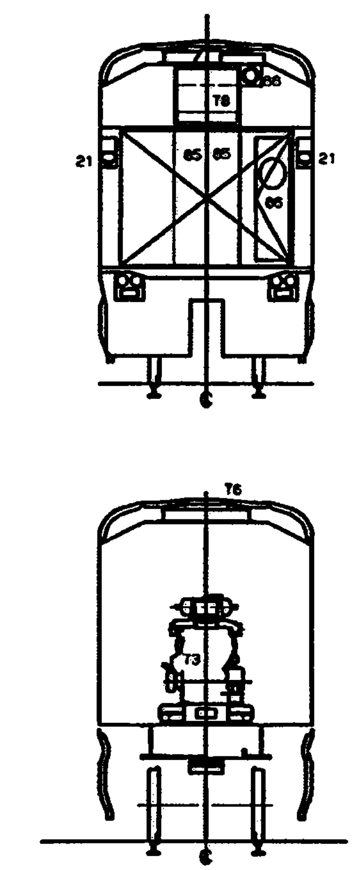
LEGEND

1. ENGINE 12N-710-G3B-EC (3200HP @ 900RPM)..
2. GENERATOR/ALTERNATOR AR15WBC/CA6A.......
3. STANDARD OIL PAN........................
4. AUXILIARY GENERATOR 18KW ....
5. TRACTION MOTOR BLOWER....................
6. GENERATOR/ALTERNATOR BLOWER..............
7. COLLISION POST...........................
8. EXHAUST MANIFOLD.........................
9. LUBE OIL STRAINER........................
10. LUBE OIL COOLER.........................
11. FILTER, ENGINE AIR......................
12. FILTER, LUBE OIL (FARR).................
13. FILTER, PRIMARY FUEL (FARR).............
14. FILTER, ELEC. CONT'L CAB'T AIR..........
15. FILTER, INERTIAL........................
16. RADIATORS (MAIN ENGINE).................
17. COOLING FAN 48" - 9 BLADE...............
18. TRUCKS - GP S.S.........................
19. WHEELS - 40" DIA. ....
20. TRACTION MOTORS - D87BTR 4 TOTAL........
21. SAND BOX (10 CU.FT/#1 END & 8 CU.FT/#2 END)
22. MAIN AIR RESERVOIRS -...................
23. FUEL TANK - 1800 US GAL - COMPARTMENTALIZED
24. BATTERIES (GNB TYPE XDZ-2700)...........
25. SHORT HOOD STRUCTURE....................
26. AIR COMPRESSOR (WILMASAN)...............
27. DUST BIN BLOWER & MOTOR.................
28. UNDERFRAME..............................
29. DRAFT GEAR - NC 390.....................
30. COUPLER - TYPE "F"......................
31. TRACTION MOTOR AIR DUCT.................
32. JACKING PAD.............................
33. WATER TANK (MAIN ENGINE)................
34. ANTI-CLIMBER............................
35. PILOT...................................
36. ENGINE ROOM ACCESS DOOR.................
37. CLEAN AIR COMPARTMENT ACCESS............
38. INERTIAL FILTER AIR INLET...............
39. COOLING SYSTEM AIR INLET (WITH SHUTTERS)..
40. ANTENNAS................................
41. ....
42. CAB ASSEMBLY (ISOLATED).................
43. CAB SEAT................................
44. CAB VESTIBULE DOOR......................
45. ENGINEERS CONSOLE.......................
46. HANDBRAKE...............................
47. BELL....................................
48. HORN (KSLA).............................
49. HANDRAILS...............................
50. NUMBER BOX (LIGHTED)....................
51. HOOD, MAIN ENGINE COOLING (REMOVABLE).....
52. HOOD, INERTIAL FILTER (REMOVABLE).........
53. NOSE PANEL (MOULDED)....................
54. ELECTRICAL CONTROL CABINET (EM 2000)......
55. HEADLIGHT (FRONT).......................
56. DYNAMIC BRAKE GRID......................
57. DYNAMIC BRAKE FAN.......................
58. WIND DEFLECTOR / MIRROR (2)...............
59. ELECTRIC CAB HEATER & AIR CONDITIONER....
60. ROOF PANELS (MOULDED)...................
61. CONDUCTORS WORK STATION.................
62. TOILET (PRIME)..........................
63. ....
64. AIR DRYER...............................
65. HATCH, TURBO/EXHAUST (REMOVABLE)..........
66. HEADLIGHT (REAR)........................
67. EXHAUST SILENCER........................
68. REMOVABLE DYN. BRK. & GEN. HATCH..........
69. CAB/VESTIBULE EXTERIOR DOORS..............
70. REFRIGERATOR............................
71. RETENTION TANK - 70 US GAL..............
72. H. E. P. COOLING HOOD...................
73. H. E. P. ENGINE (CAT 3412DITTA)...........
74. H. E. P. ALTERNATOR.....................
75. H. E. P. RADIATORS......................
76. H. E. P. COOLING FAN....................
77. H. E. P. EXHAUST SILENCER...............
78. H. E. P. INERTIAL AIR FILTER............
79. H. E. P. CONTROL CABINET................
80. H. E. P. START STATION..................
81. H. E. P. ENGINE AIR FILTERS.............
82. H. E. P. WATER EXPANSION TANK...........
83. EMERGENCY STROBE LIGHT (RED)............
84. MARKER LIGHT (RED)......................
85. REAR MAINTENANCE DOOR...................
86. REAR PERSONNEL DOOR.....................
87. AUXILIARY LIGHTS........................









LOCOMOTIVE HEIGHT TOLERANCE = ± 1.50IN.
LOCOMOTIVE WIDTH TOLERANCE = ± .50IN.
LATERAL (BOL. + JRLS. W/NEW TRUCKS) = 2.44 IN.
LOCOMOTIVE IS SHOWN INCLUDING HALF VARIABLE SUPPLIES AND IN NEW CONDITION, STANDING STILL ON LEVEL AND TANGENT TRACK.

REF. CLEARANCE DWG. 10643452

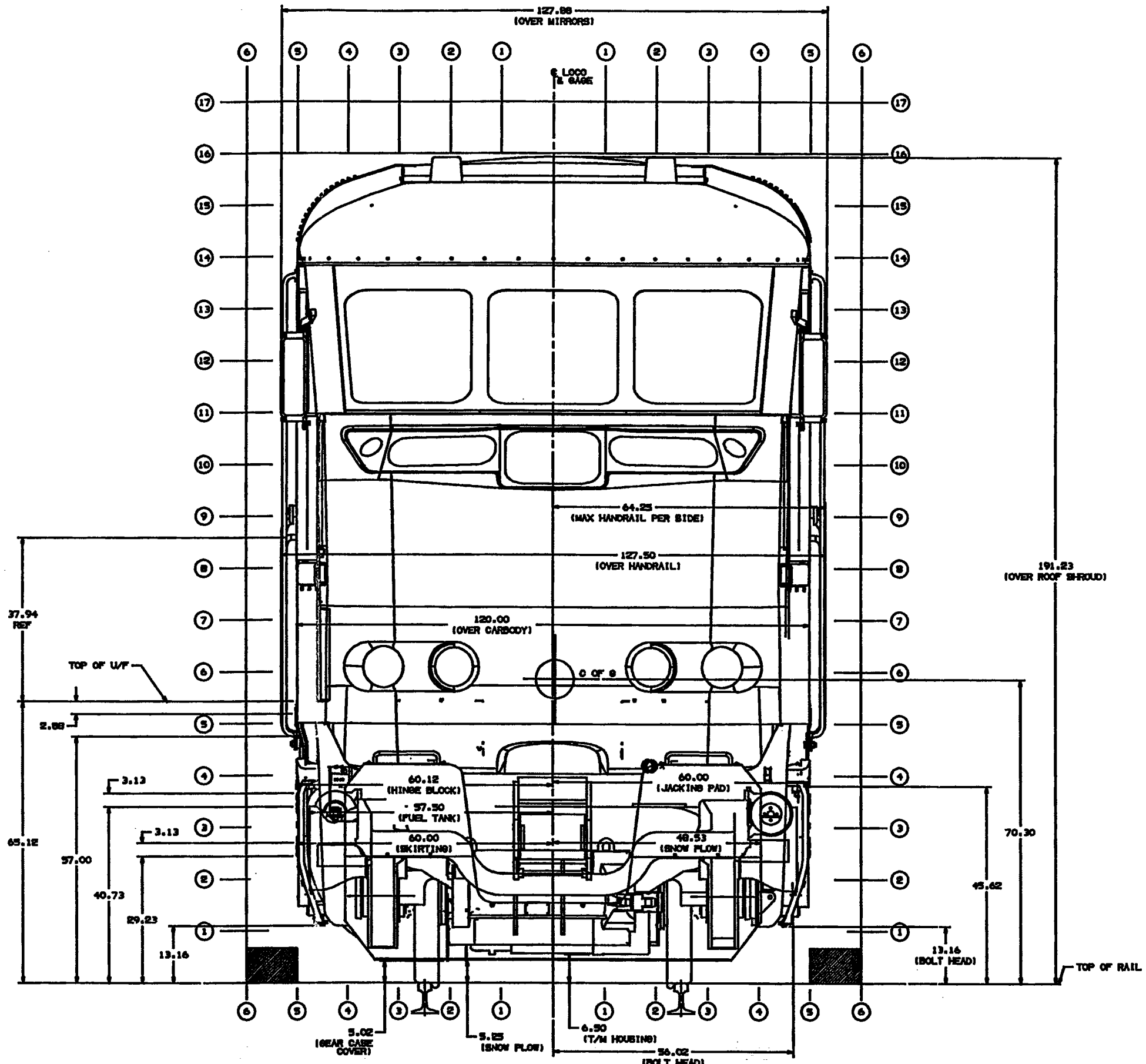
GENERAL MOTORS LOCOMOTIVE GROUP

LOCOMOTIVE OUTLINE

AMTRAK F59PHI

10643846

SHEET 1 OF 1



STATIC DIAGRAM

NOTES:
LOCOMOTIVE HEIGHT TOL. = ±1.50 IN.
LOCOMOTIVE WIDTH TOL. = ±0.53 IN.
LATERAL (BOL. ↔ JNLS. WITH NEW TRUCKS) = ±2.44 IN.
LOCO IS SHOWN INCLUDING HALF VARIABLE SUPPLIES IN NEW CONDITION AND STANDING STILL ON TANGENT AND LEVEL TRACK.
VERTICAL DIMENSIONS WILL BE 1.50 IN. LESS WITH FULL WHEEL WEAR.

VERTICAL DIMENSIONS CAN VARY ±0.25 IN. DUE TO VARIABLE SUPPLIES.
VERTICAL DIMENSIONS WILL BE 3.50 IN. LESS WITH FULLY COMPRESSED PRIMARY SPRINGS (JOURNAL) AND WITH THE SECONDARY SPRINGS (ELLIPTICAL) TO THEIR STOPS.
LOCOMOTIVE BODY SHROUD TO MATCH PROFILE AND PLOTTING DIMENSIONS OF CALTRANS CALIFORNIA BI-LEVEL RAIL CAR.

APERTURE CARD ONLY

CLEARANCE DIAGRAM

10661135

SHEET 1 OF 1

US BUILD / IN FORMAT

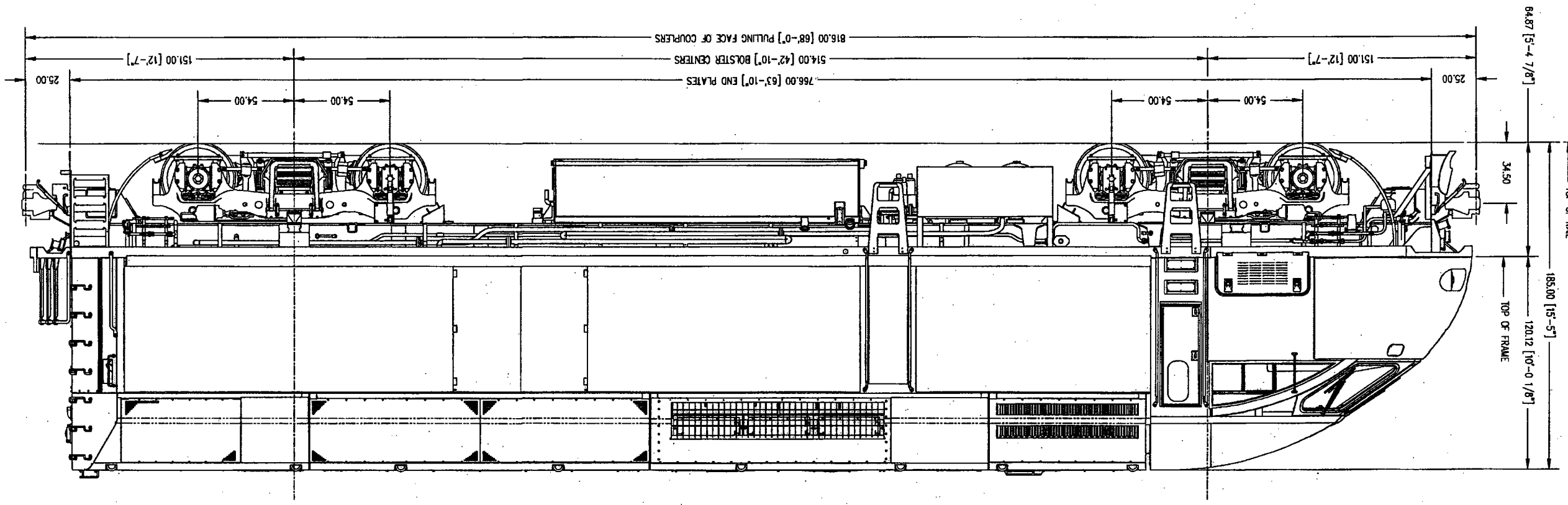
THIRD ANGLE PROJECTION			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: DECIMALS .X ± .2, .XX ± .06, .XXX ± .010; FRACTIONS XX ± 1/4; ANGLES X ± 1°, XX ± 0.5°			
	APPROVALS	DATE	
DRAWN	SMALLR	05/19/06	
CHECKED BY	ENDERS	05/19/06	
ENGINEER	ENDERS	05/19/06	
FIRST USED	2029065		
TITLE/DESC	GENERAL ARRANGEMENT SCRRA MP36PH-3C		
DWG SIZE D	DRAWING NUMBER 2029511		REV A
SCALE 1:32		SHEET 01 OF 02	

MotivePower — A Wabtec Company — 4600 APPLE STREET, BOISE, ID 83716, 208-947-4600

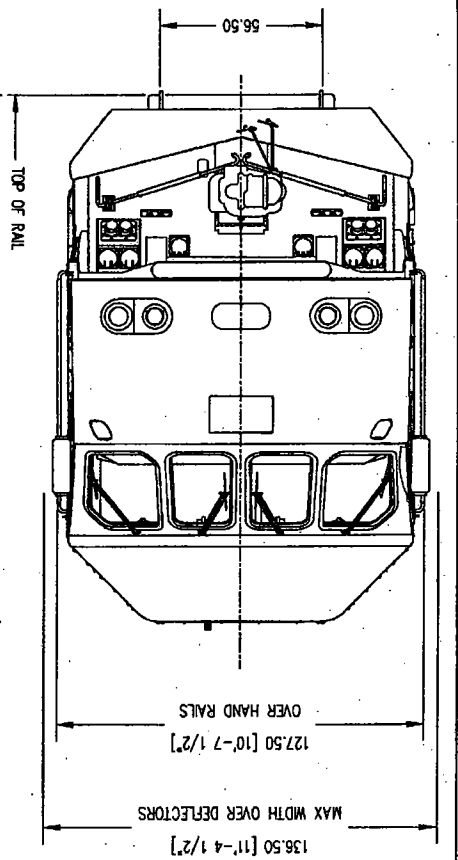
REV	DESCRIPTION	DATE	REVISED BY CHECKED BY RELEASED BY
A	E0 061235 REVISED PER CUSTOMER REVIEW	11/06/06	ENDERS
-	E0 060532 INTVL. RELEASE	05/19/06	ENDERS SMALLER

REVISION HISTORY

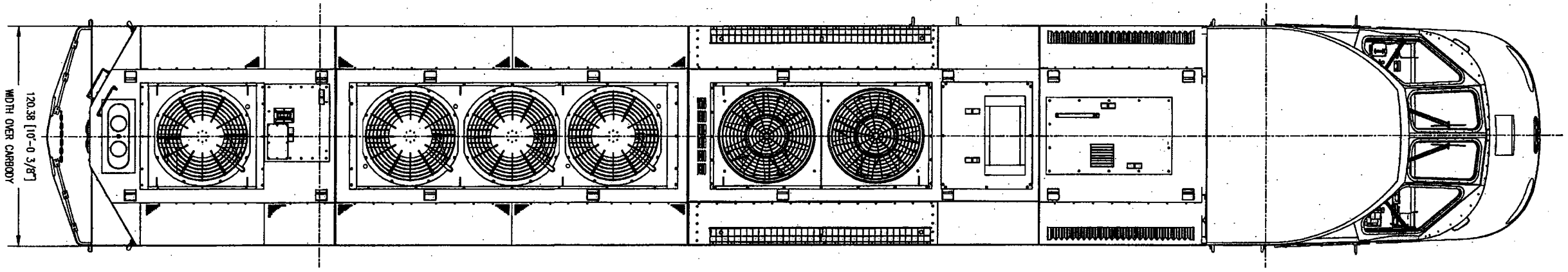
LEFT SIDE VIEW



FRONT VIEW



TOP VIEW



NOTES:

1. LOCOMOTIVE HEIGHT TOLERANCE = + 1-½", - 1-½"
2. LOCOMOTIVE WIDTH TOLERANCE = +/- ½"
3. TRUCK LATERAL (BOLSTERS + JOURNALS W/NEW TRUCK) = ± 2-½" NOM
4. LOCOMOTIVE SHOWN WITH 40" WHEELS, IN NEW CONDITION, STANDING STATIONARY ON LEVEL TANGENT TRACK WITH HALF SUPPLIES

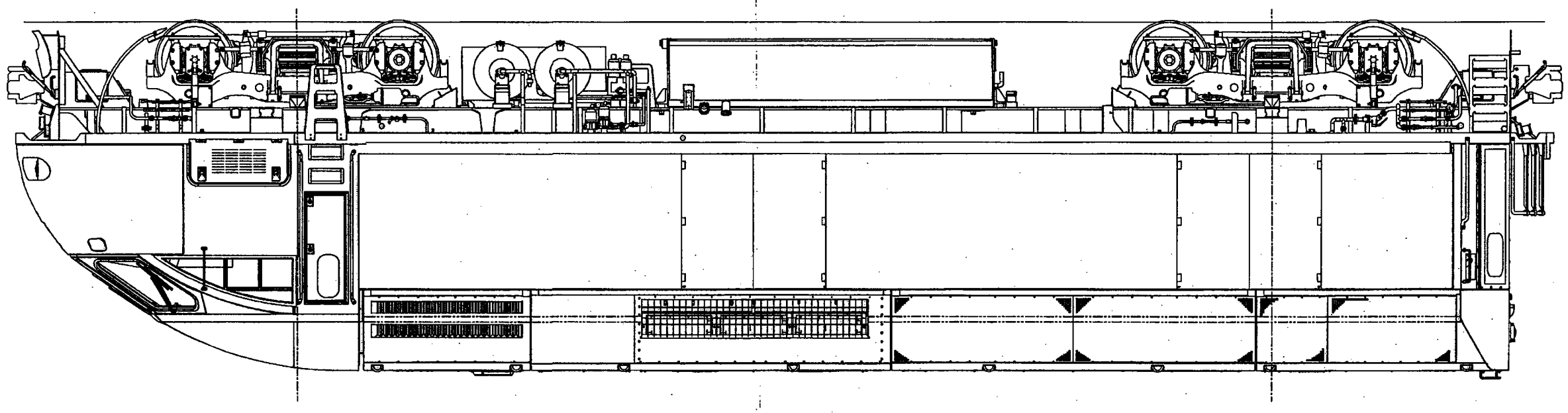
APPROVALS	DATE
DRAWN SMILLER	05/19/06
CHECKED BY EAVERS	05/19/06
ENGINEER EAVERS	05/19/06

MotivePower — A Wabtec Company
4600 APPLE STREET
BOISE, ID 83716
208-947-4600

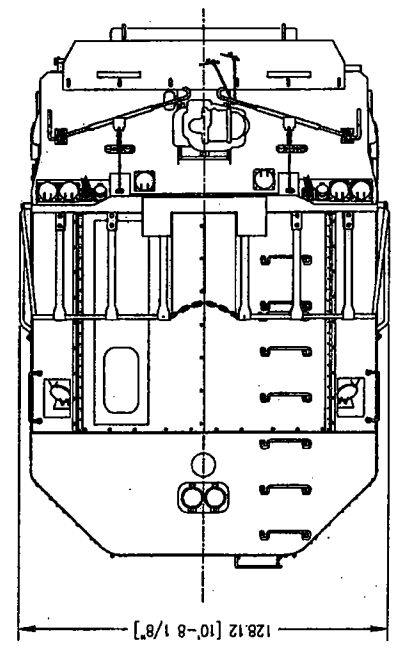
DWG SIZE D | DRAWING NUMBER 2029511 | REV A

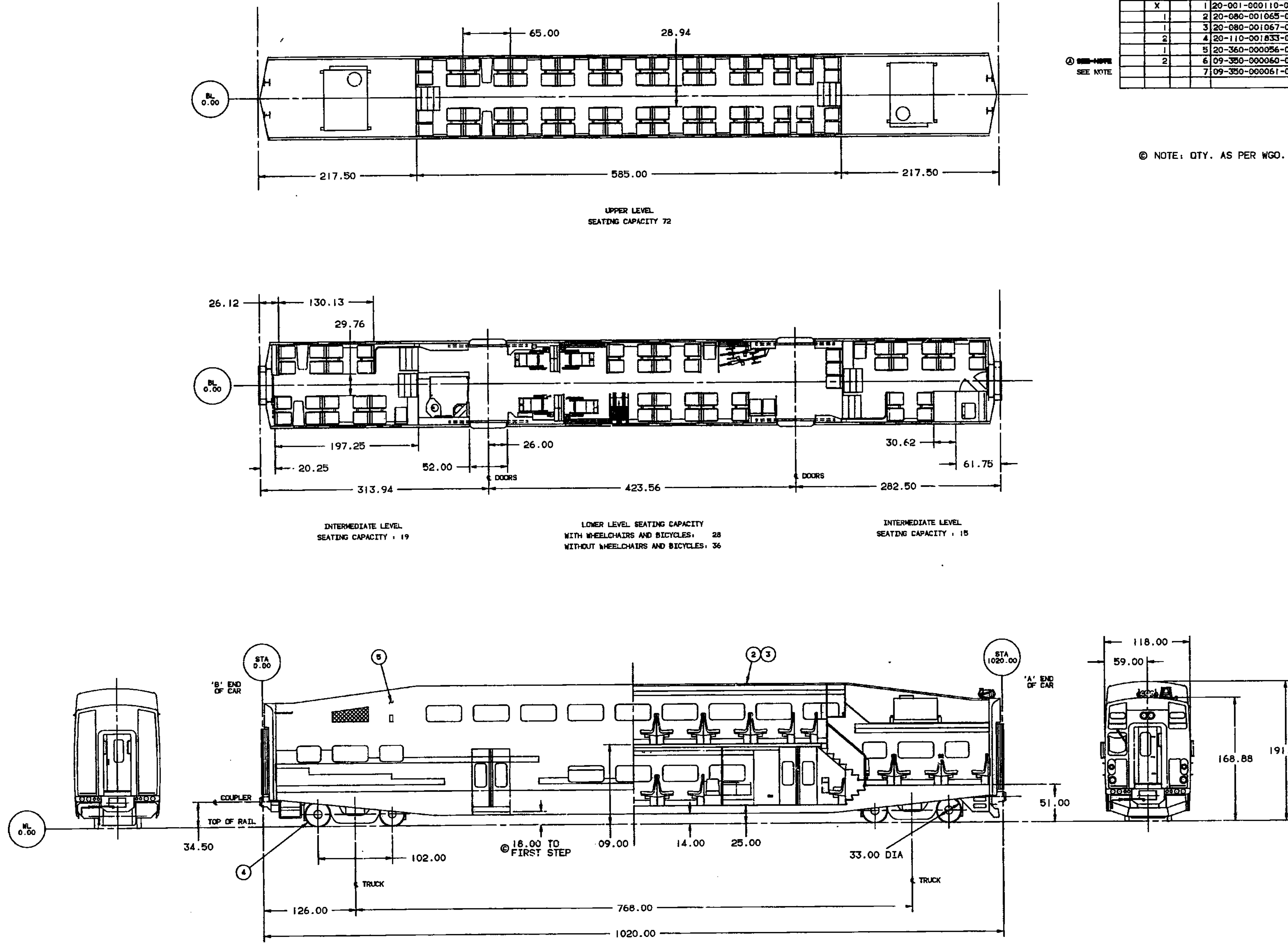
SCALE 1:32 | AUTOCAD | SHEET 02 OF 02

RIGHT SIDE VIEW



FRONT VIEW





© NOTE: QTY. AS PER WGO. NO. 4990-9001 ITEM ~~135 AND~~ 136.

Ⓐ ~~[illegible]~~ SEE NOTE

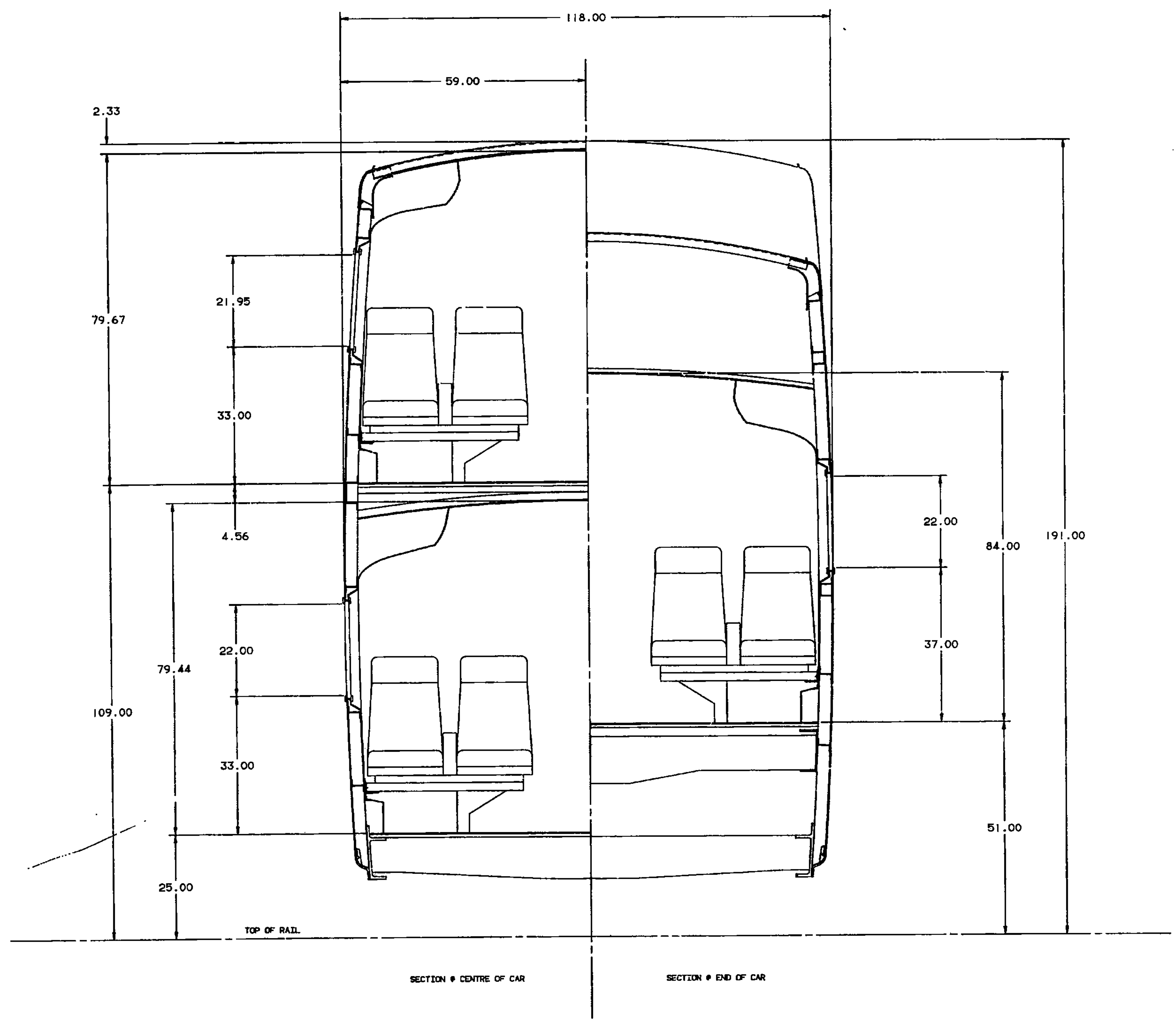
REF. DRAWING		DRAWN	JC 91.11.25	SIZE A0 · DWG NO 20-001-000110 · REV. C
TOLERANCES UNLESS OTHERWISE SPECIFIED ANGLE ± 1° .X = ± .1 .XX = ± .06 .XXX = ± .015	CAN/CSA B78.2	CHECKED	MH 92.06.01	DRAWING TITLE: LACTC BI-LEVEL ACCESSIBLE TOILET CAB CAR G.A.
		STRESS		SCALE 1:50 · SHEET 1/2
		SYSTEMS		
		ELEC		
		LEAD ENG	RK 92/06/01	UTDC
THIS DRAWING IS THE PROPERTY OF UTDC INC. AND MAY NOT, IN WHOLE OR IN PART BE DUPLICATED OR DISCLOSED, OR USED FOR MANUFACTURE OF THE PART OR PARTS DISCLOSED HEREIN WITHOUT THE PRIOR WRITTEN PERMISSION OF UTDC INC.		MTHDS ENG	LAW 92/06/01	CAN-CAR THUNDER BAY WORKS
		UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS IN INCHES		

QTY. REQ'D		ZONE	ITEM	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	FIN. CODE
	X		1	20-001-000110-001	LACTC G.A.		F###.#
	1		2	20-080-001065-001	MODULE SPLICE		
	1		3	20-080-001067-001	INST.- EQP. AFT	SPLICE	
	2		4	20-110-001833-001	INST.-TRUCK		
	1		5	20-360-000056-001	PAINT SCHEMATIC		
	2		6	09-350-000060-001	KEY-STAFF		
			7	09-350-000061-001	KEY-STAR SHAPE		

REV	REVISION
A	IT.6 QTY. WAS AS PER NOTE. NOW QTY.= 2.
B	PICTORIALLY UPDATED-JC/92.05.20.
C	18.00 WAS 17.00. NOTE CHANGED. PICTORIALLY UPDATED-JC/92.06.15.

A0 SIZE · DWG NO 20-001-000110 · REV. C

CAD DRAWING DO NOT SCALE OR ALTER MANUALLY



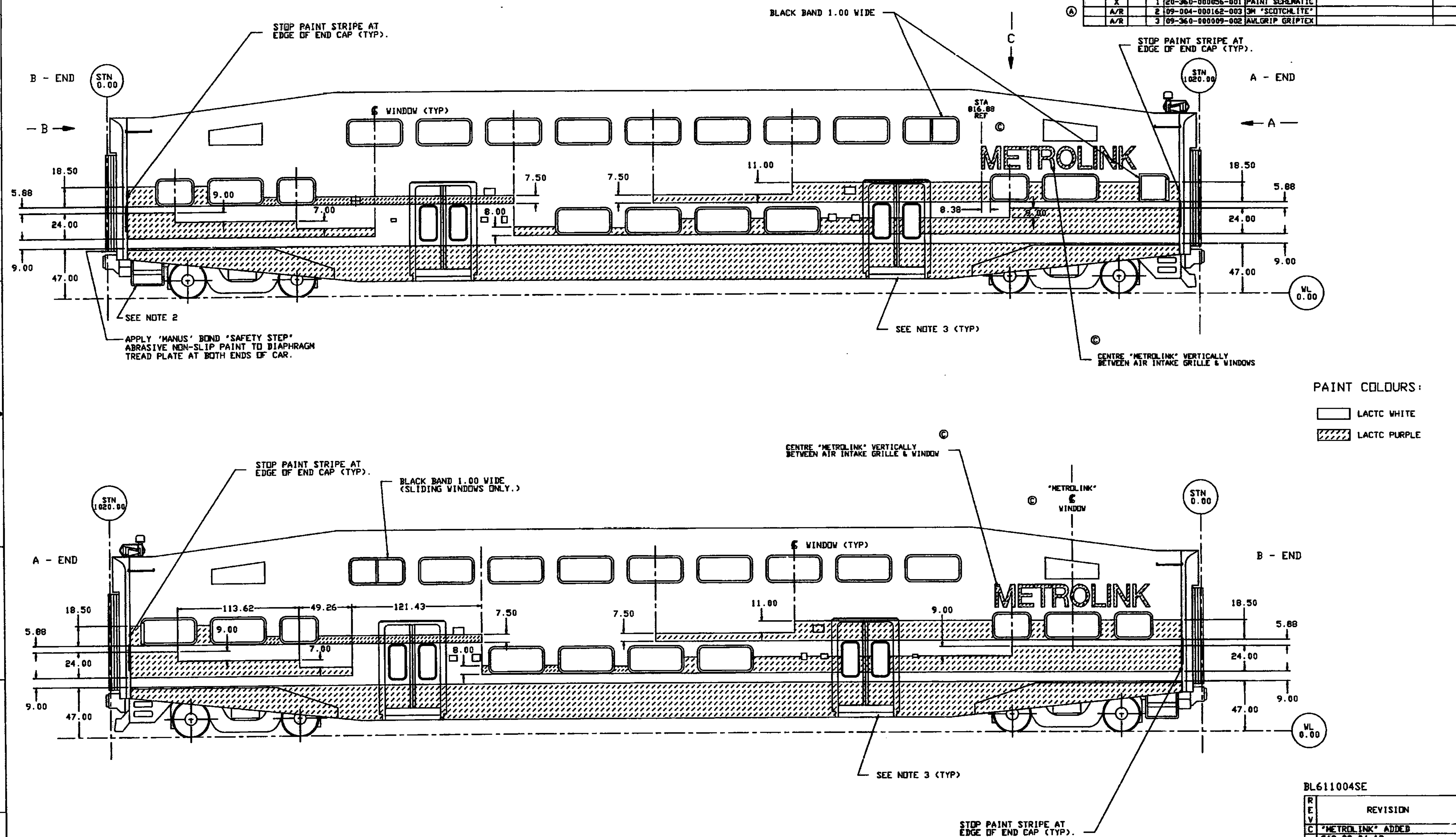
REF. DRAWING		DRAWN	JC 91.11.25	SIZE A0	DWG NO 20-001-000110 REV. C
TOLERANCES UNLESS OTHERWISE SPECIFIED ANGLE ± 1° .X = ± .1 .XX = ± .06 .XXX = ± .015	CAN/CSA B78.2	CHECKED	MH 92.06.01	DRAWING TITLE	LACTC BI-LEVEL ACCESSIBLE TOILET CAB CAR G.A.
		STRESS		SCALE 1:10	SHEET 2/2
		SYSTEMS			
		ELEC			
		LEAD ENG	RK 92/06/01		
THIS DRAWING IS THE PROPERTY OF UTDC INC. AND MAY NOT, IN WHOLE OR IN PART BE DUPLICATED OR DISCLOSED, OR USED FOR MANUFACTURE OF THE PART OR PARTS DISCLOSED HEREIN WITHOUT THE PRIOR WRITTEN PERMISSION OF UTDC INC.		NTHDS ENG	LAW 92/06/01		UTDC CAN-CAR THUNDER BAY WORKS
		UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS IN INCHES			

QTY.REQ'D	ZONE	ITEM	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	FIN. CODE

REV	REVISION
A	SEE SHEET 1 FOR REVISION.
B	SEE SHEET 1 FOR REVISION-JC/92.05.20.
C	SEE SHEET 1 FOR REVISION-JC/92.06.15.

A0 SIZE	DWG NO 20-001-000110	REV. C

CAD DRAWING DO NOT SCALE OR ALTER MANUALLY



REF. DRAWING	20-345-000047	DRAWN	RCT 91-11-20
TOLERANCES UNLESS OTHERWISE SPECIFIED		CHECKED	
ANGLE ± 1°	CAN/CSA	STRESS	
.X = ± .1		SYSTEMS	
.XX = ± .06	378.2	ELEC	
.XXX = ± .015		LEAD ENG	
		MTHDS ENG	

SIZE A0 DWG NO 20-360-000056 REV. C

DRAWING TITLE: PAINT SCHEMATIC - CAB

SCALE 1:30 SHEET 1/2

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS IN INCHES

Bombardier Inc.
Groupe matériel de transport
Transportation Equipment Group

QTY. REQ'D		ZONE	ITEM	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	FIN. CODE
	X		1	20-360-000056-001	PAINT SCHEMATIC		
Ⓐ	A/R		2	09-004-000162-003	3M 'SCOTCHLITE'		
	A/R		3	09-360-000009-002	AWLGRIP GRIPTEX		

BL611004SE

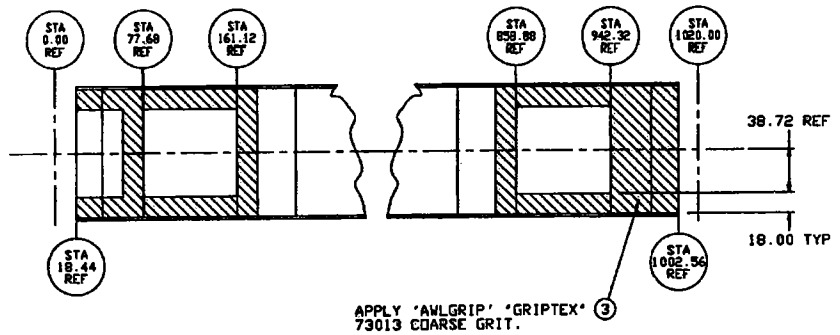
REV	REVISION
C	"METROLINK" ADDED GAC 92-04-13

A0 SIZE DWG NO 20-360-000056 REV. C

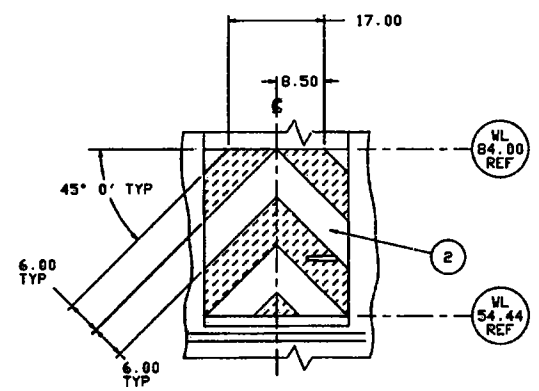
CAD DRAWING DO NOT SCALE OR ALTER MANUALLY

REF DRAWING	20-345-000047	DRAWN	RCT 91-11-20	SIZE A0	DWG NO 20-360-000056	REV. D
TOLERANCES UNLESS OTHERWISE SPECIFIED ANGLE ± 1° .X = ± .1 .XX = ± .05 .XXX = ± .015	CAN/CSA 278.2	CHECKED		DRAWING TITLE	PAINT SCHEMATIC - CAB	
		STRESS		SCALE	AS NOTED	SHEET 2/2
		SYSTEMS		Bombardier Inc. Groupe matériel de transport Transportation Equipment Group		
		ELEC				
		LEAD ENG				
		MTHDS ENG				

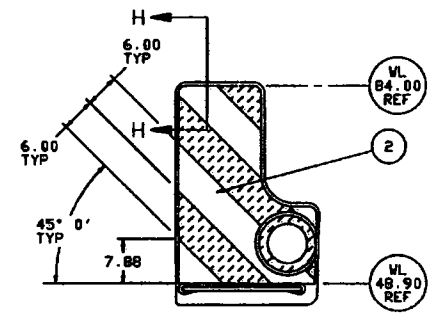
QTY. REQ'D	ZONE	ITEM	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	FIN. CODE



VIEW ON ARROW 'C'
SCALE 1:50



DETAIL 'F'
SCALE 1:10



DETAIL 'G'
SCALE 1:10

PAINT SPECIFICATION:

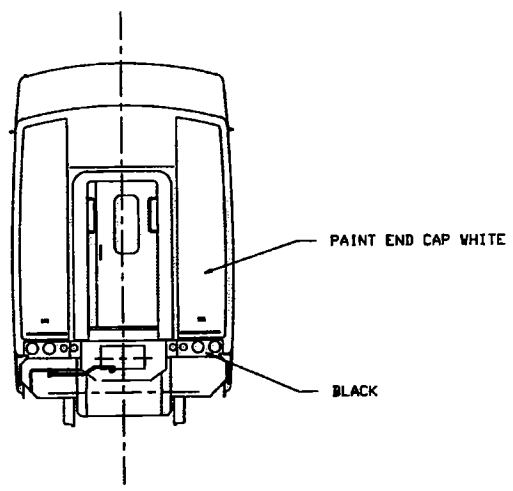
VENDOR: DOWNING PRODUCTS LTD.

643-66-7034 LACTC WHITE:	2030.00 SQ.FT.
643-66-1806 LACTC PURPLE:	630.00 SQ.FT.
BLACK	26.00 SQ.FT.

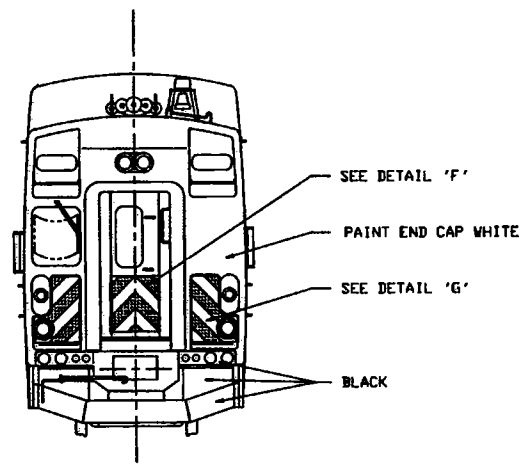
'AKZO' POLYURETHANE ENAMEL PAINT AND APPLICATION SHALL CONFORM TO TSS-1938, LATEST ISSUE.

NOTES:

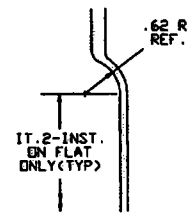
1. ALL HANDHOLDS TO BE PAINTED WHITE.
2. CORNER STEPS AND WIRE RECEPTACLE MOUNTING BOXES PAINTED BLACK.
3. SIDE STEPS TO REMAIN UNPAINTED, NATURAL ALUMINUM.
4. ~~NON-SLIP PAINT TO BE USED AROUND HATCH.~~
5. EXTERIOR OF SIDE DOOR TO BE PAINTED WHITE AND PURPLE, FOLLOWING CORRESPONDING PAINT LINES OF SIDE WALL.
6. HEADLIGHTS, AND ROOF MOUNTED EQUIPMENT (BELL, HORN & HORN GUARDS) TO BE PAINTED WHITE
7. DITCHLIGHT HOUSING TO BE PAINTED PURPLE
8. SIDE MIRRORS TO BE LEFT UNPAINTED
9. INTERIOR SURFACE OF CAB END DOOR AND INSIDE SURFACE OF COLLISION BOX (VISIBLE SURFACE) ARE TO BE FINISH PAINTED TO MATCH ROYALITE FR#7016.



VIEW ON ARROW 'B'
SCALE 1:30



VIEW ON ARROW 'A'
SCALE 1:30

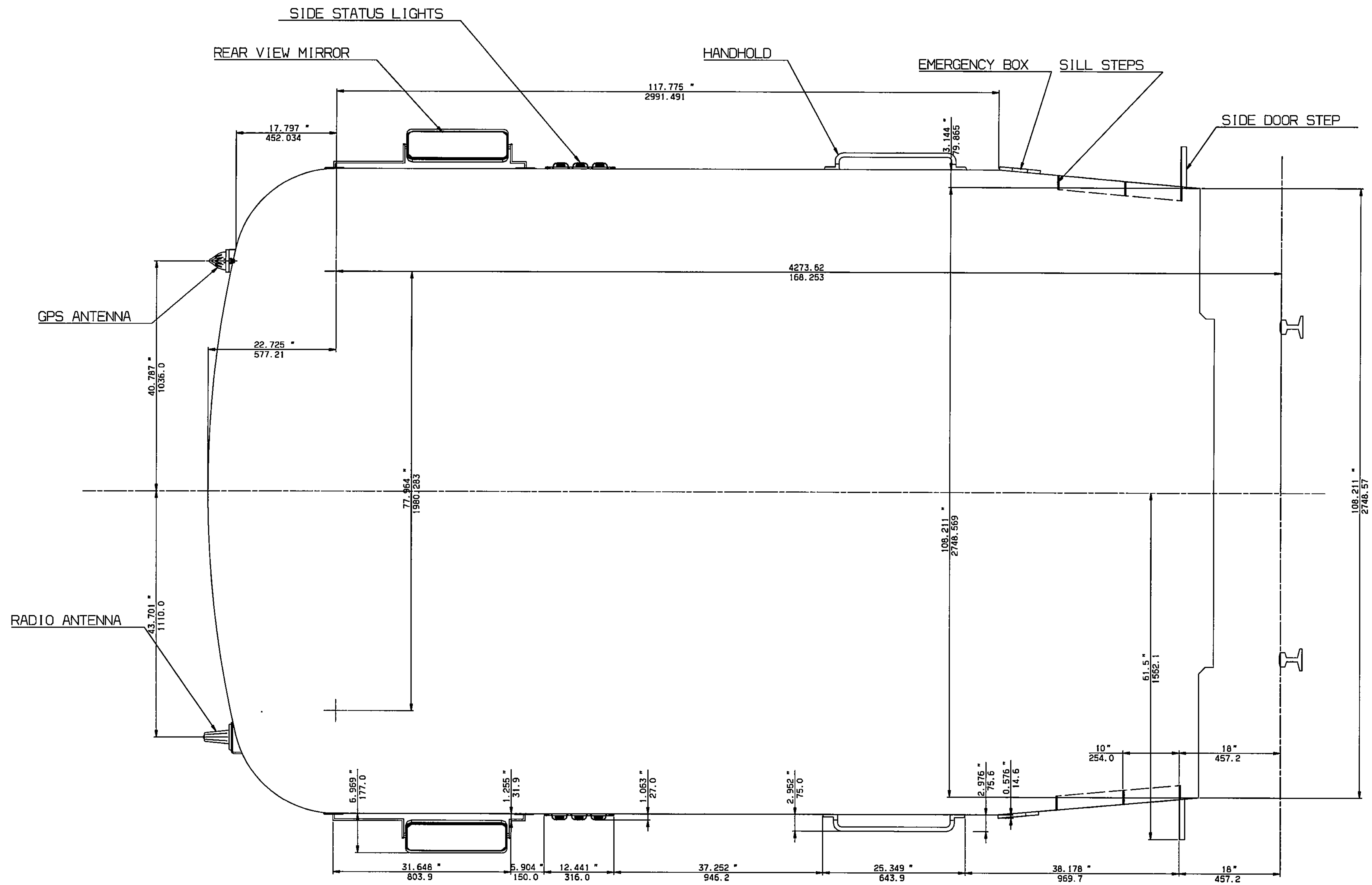


SECTION 'H-H'
SCALE 1:1

BL611004SE

REV	REVISION
D	SEE R.D. CJR 93.04.14)
A0 SIZE	DWG NO 20-360-000056 REV. D

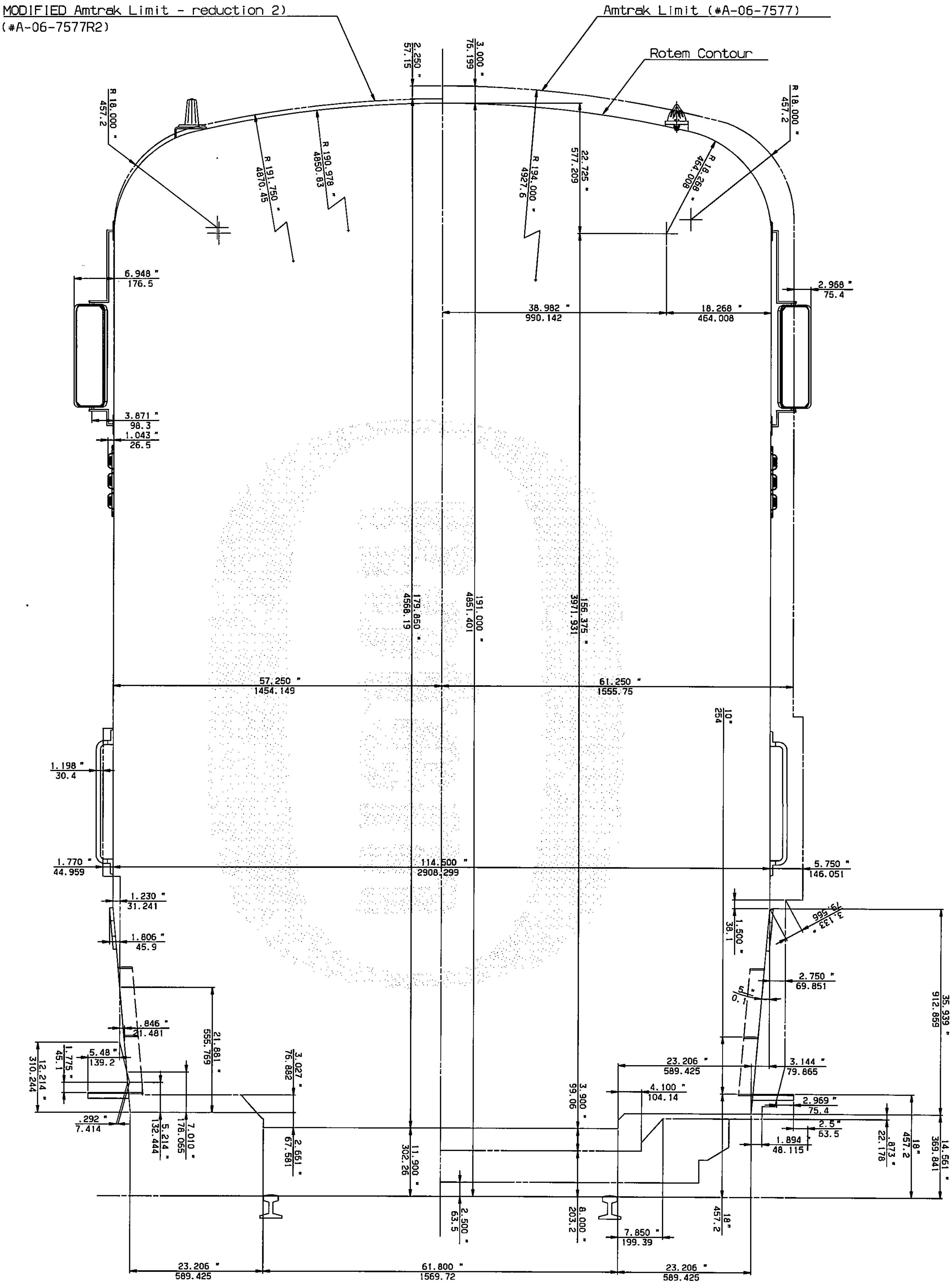
CAD DRAWING DO NOT SCALE OR ALTER MANUALLY



기호 MARK	일자 DATE	변경 내역 DETAIL OF REVISION(E.C ZONE)	설계변경 E.C NO.	설계 DGN	검토 CHK	승인 APP
A	2007.8.28	ANTENNAS(GPS, RADIO), EMERGENCY BOX WERE RELOCATED REAR VIEW MIRROR, SILL STEP WERE MODIFIED	Not applied	K.H.CHOI	W.H.CHOI	K.W.LEE

품번 NO.	부품 번호 PART NO.	품명 DESCRIPTION	재질 MATERIAL / 수량 Q'TY / 중량 W.T / 비고 REMARKS
승인 APP	K.W.LEE 2007.08.28	재질 MAT'L	이름 TITLE: Vehicle static outline
검토 CHK	K.W.LEE 2007.08.28	총중량 G.W	
설계 DGN	W.H.CHOI 2007.08.28	MC VO CT	도면 번호 DRG. NO: GAP00601 — Ver. Rev. -A
제도 DRG	W.H.CHOI 2007.08.28	SIZE D	SCALE 1/10 — 매수 SHEET 1 of 4
	참조번호 REF. NO.		HYUNDAI Rotem 현대로템주식회사

CATIA



MARK	DATE	DETAIL OF REVISION(E.C ZONE)	E.C NO.	DGN	CHK	APP
A	2007.8.28	ANTENNAS(GPS,RADIO) EMERGENCY BOX WERE RELOCATED REAR VIEW MIRROR, SILL STEP WERE MODIFIED	applied	W.H.CHOI	W.H.CHOI	K.W.LEE

TITLE: Vehicle static outline

DRG. NO: GAP00601 — Ver. Rev.-A

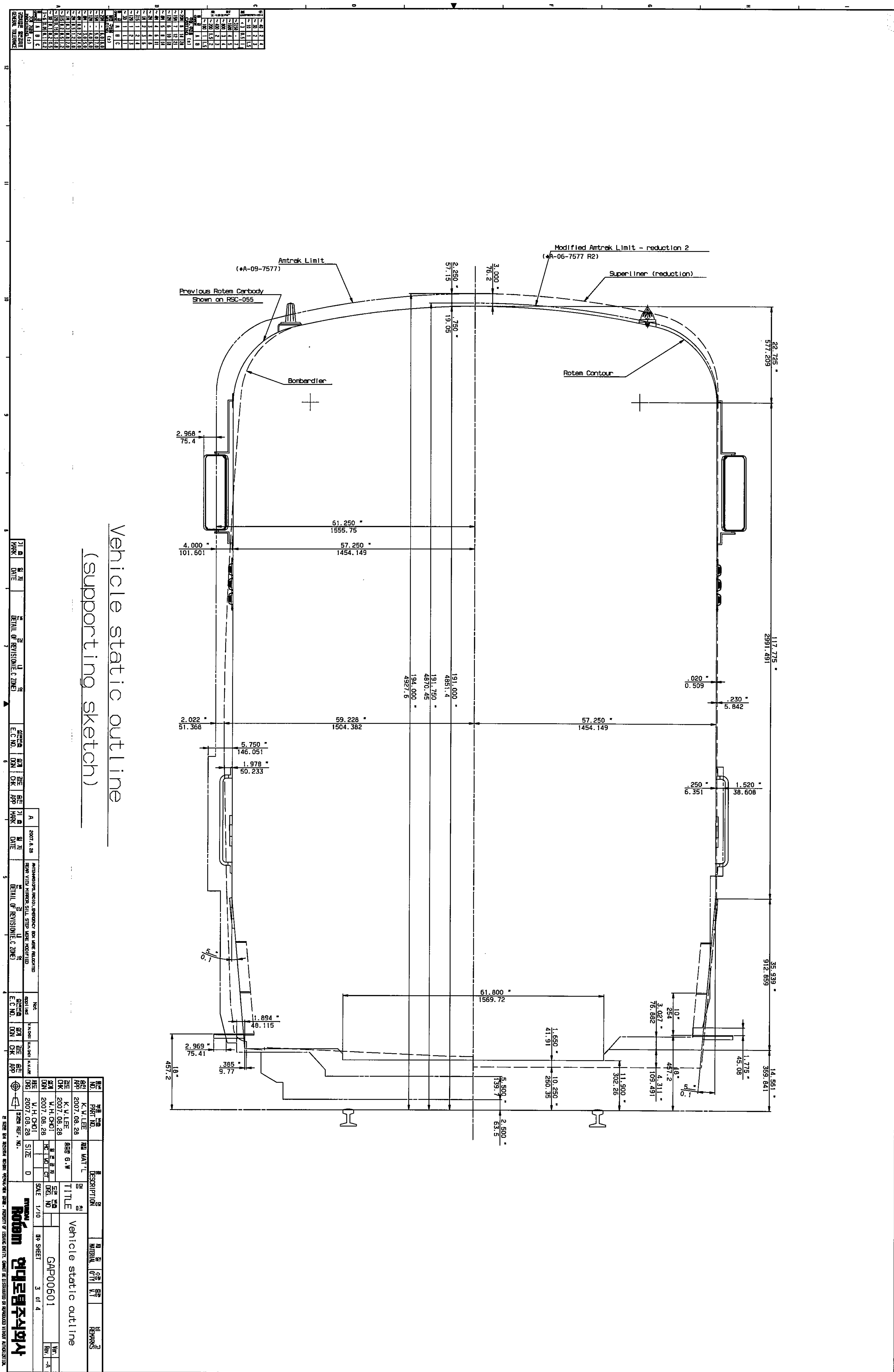
SCALE 1/10 — SHEET 2 of 4 — SIZE D

APP: K.W.LEE 2007.08.28 — CHK: K.W.LEE 2007.08.28 — DGN: W.H.CHOI 2007.08.28 — DRG: W.H.CHOI 2007.08.28

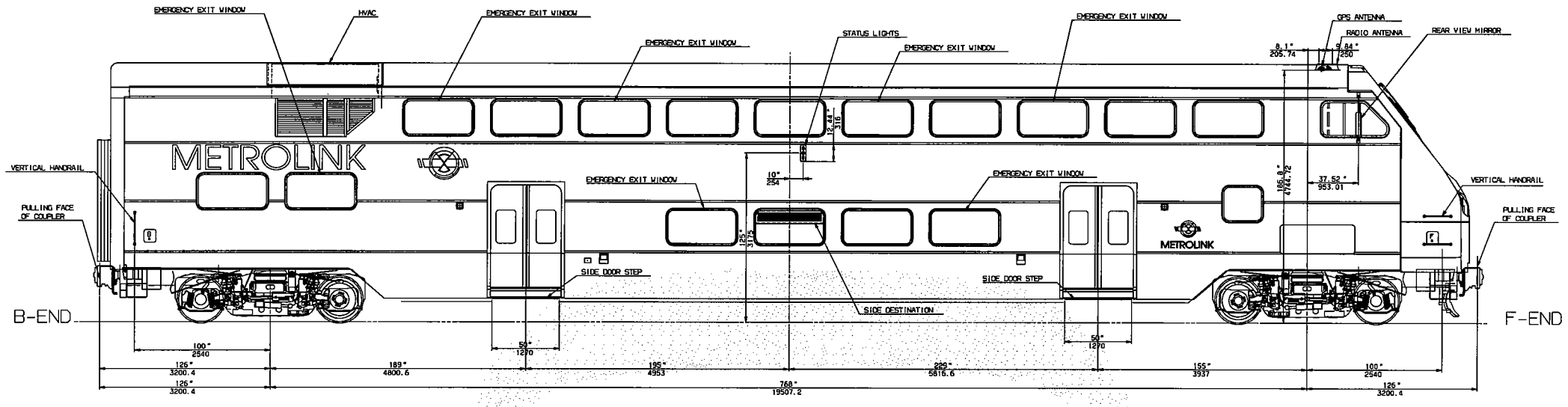
MAT'L: SS 6.W

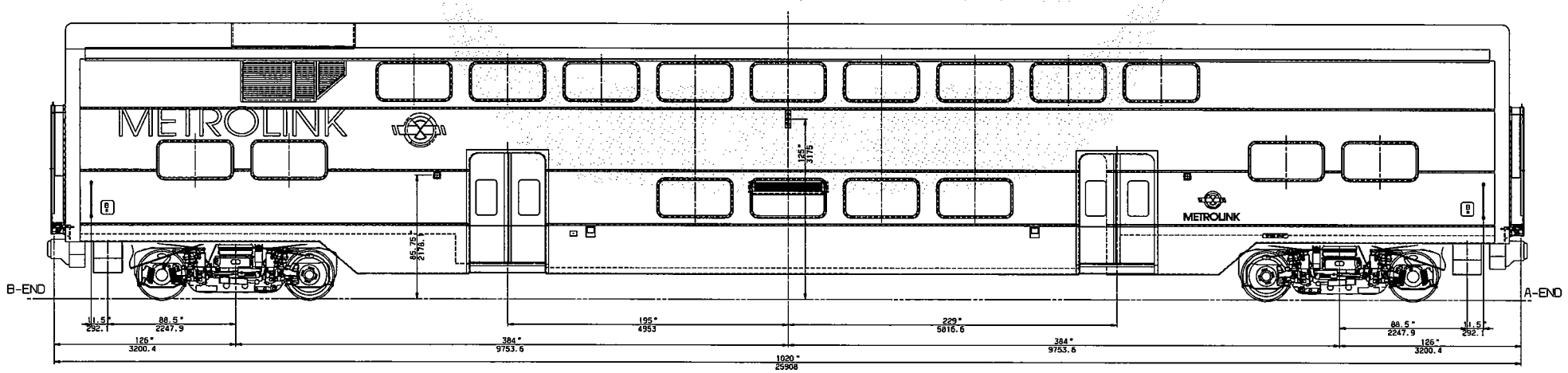
HYUNDAI Rotem 현대로템주식회사

CATIA



Modified Amtrak Limit - reduction 2
(#A-06-7577 R2)
Amtrak Limit
(#A-09-7577)
Superliner (reduction)
Previous Rotem Carbody
Shown on RSC-055
Bombardier
Rotem Contour
2.250"
57.15
3.000"
76.2
.750"
19.05
22.725"
577.209
2.968"
75.4
61.250"
1555.75
4.000"
101.601
57.250"
1454.149
117.775"
2991.491
191.000"
4851.4
191.750"
4870.45
194.000"
4927.6
.020"
0.509
.230"
5.842
2.022"
51.368
59.228"
1504.382
57.250"
1454.149
5.750"
146.051
1.978"
50.233
.250"
6.351
1.520"
38.608
35.939"
912.859
61.800"
1569.72
1.894"
48.115
1.650"
41.91
10"
254
3.027"
76.882
2.969"
75.41
.385"
9.77
18"
457.2
5.500"
139.7
10.250"
260.35
11.900"
302.26
4.311"
109.491
1.775"
45.08
14.561"
369.841
2.500"
63.5
Vehicle static outline
(supporting sketch)
A
2007.8.28
REAR VIEW MIRROR, SILL STEP WERE MODIFIED
DETAIL OF REVISION(E.C ZONE)
K.W.LEE
2007.08.28
W.H.CHOI
2007.08.28
TITLE
Vehicle static outline
DWG. NO
GAP00601
SCALE 1/10
SIZE D
SHEET 3 of 4
Rev. -A
Rotem
현대로템주식회사
CATIA



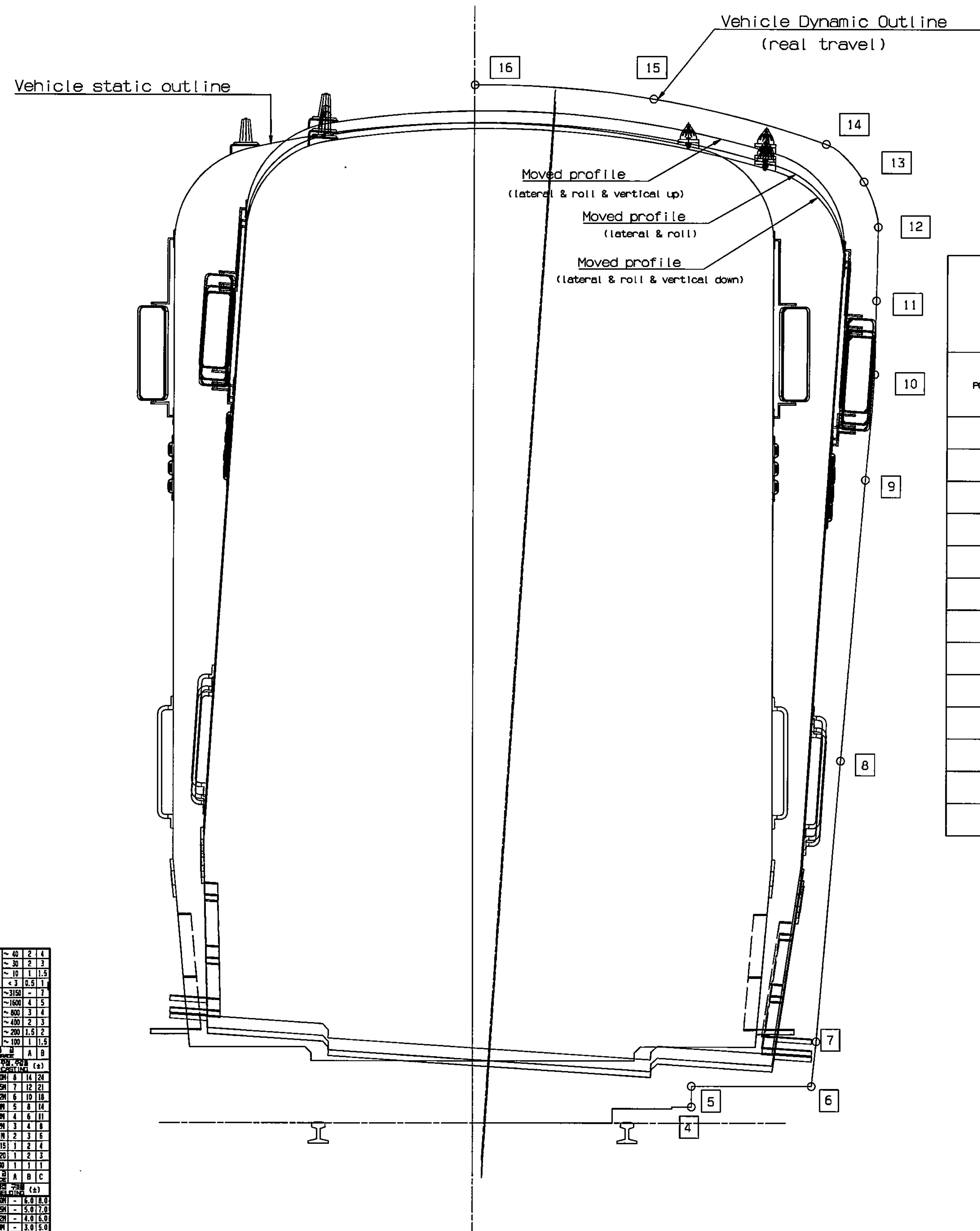


VIEW A-A

Vehicle static outline
(supporting sketch)

NO.	PART NO.	DESCRIPTION	MATERIAL	QTY	REMARKS
DES APP	K.W.LEE 2007.08.28	GD MAT'L			
DRC CHK	K.W.LEE 2007.08.28	BBE 0.W	TITLE		VEHICLE STATIC OUTLINE
DSN DSN	W.H.CHOI 2007.08.28		SIZE	DRG NO	GAP00601
DRC DRC	W.H.CHOI 2007.08.28	SIZE E	SCALE		Rev. -A
		ECN REF. NO.			SHEET 4 of 4

HYUNDAI Rotem 현대로템주식회사



Note

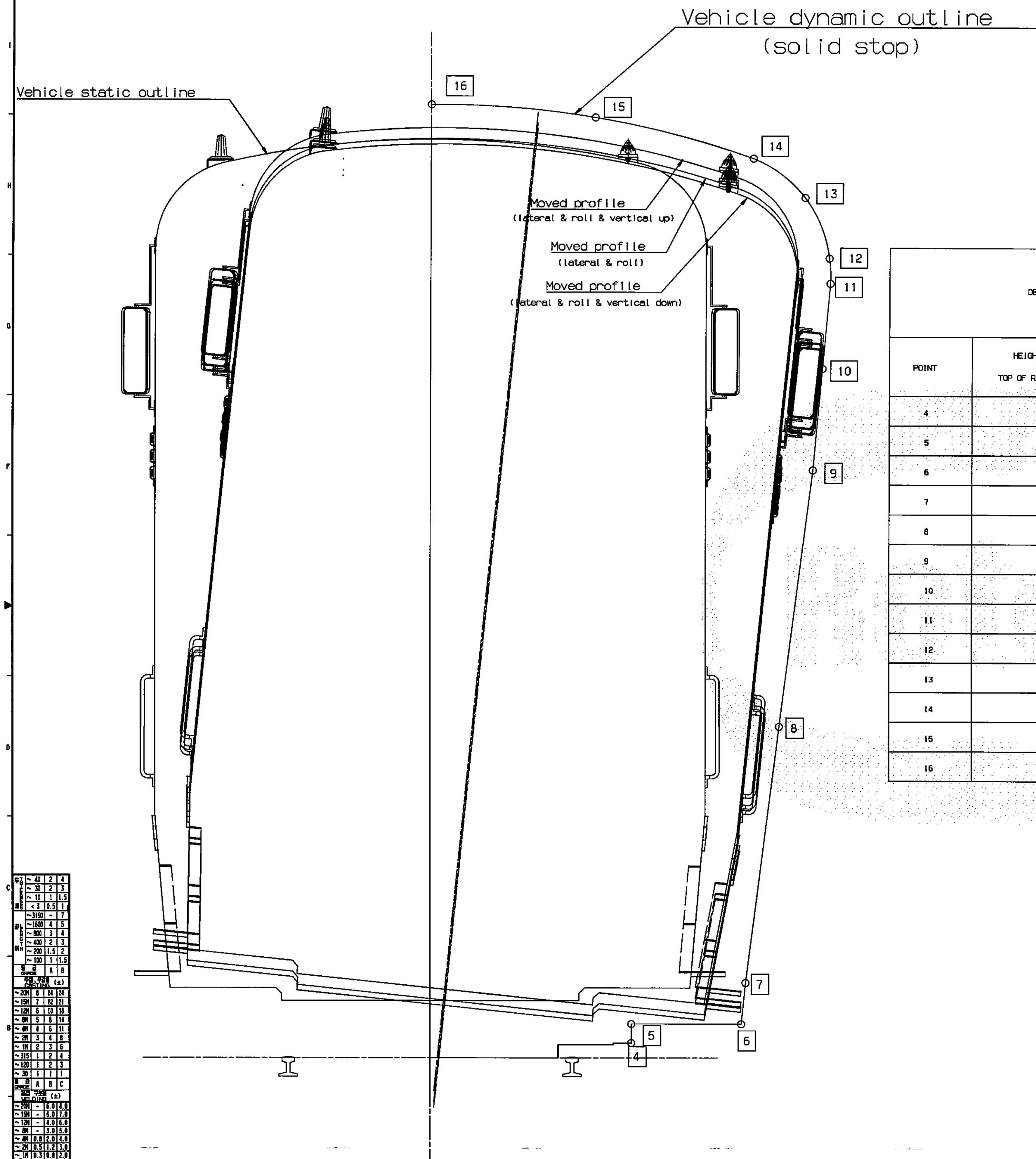
1. The considered carbody movements are shown as follows
2. The real suspension displacements are calculated for a stationary car on a track with 6 inches of unbalanced superelevation (AW3) relative to track

ROTEM CAR (REAL TRAVEL) DEFLECTED CAR DIMENSIONS (DYNAMIC OUTLINE) RELATIVE TO DATUM		
POINT	HEIGHY ABOVE TOP OF RAIL (INCH)	WIDTH FROM TRACK CENTER (INCH)
4	3.12	41.84
5	7.06	41.84
6	7.06	64.84
7	15.64	65.74
8	69.20	70.35
9	122.88	74.98
10	143.03	76.66
11	157.11	76.95
12	171.18	77.24
13	179.82	74.49
14	186.99	67.22
15	195.56	34.14
16	198.25	0

ITEM	ROTEM CAR (real travel)	UNIT
1.outline at the roof		
new 33 inch diameter wheels	33	inch
secondary air springs over-inflated to vertical stops	2.25	inch
2.outline at the side		
maximum wheel-rail clearance resulting from track widening and flange wear	1.37	inch
primary suspension lateral play	0.06	inch
primary suspension roll calculated for a stationary car on a track with 6 inches of unbalanced superelevation(AW3) relative to track	2.218	degree
lateral travel of the bolster	2.20	inch
bolster roll angle relative to bogie	0.663	degree
secondary roll relative to bolster	0.952	degree
3.outline at the truck		
maximum uncompensated wheel wear	0.50	inch
primary suspension deflection resulting from an AW3 load	0.62	inch

승인 APP	K.W.LEE 2007.08.28	재질 MAT'L	TITLE	Vehicle Dynamic outline
검토 CHK	K.W.LEE 2007.08.28	중량 G.W		
설계 DGN	W.H.CHOI 2007.08.28	DRG. NO	GAP00600	Rev. -A
제도 DRG	W.H.CHOI 2007.08.28	SIZE D	SCALE 1/10	SHEET 1 of 2

HYUNDAI Rotem 현대로템주식회사



Note

1. The considered carbody movements are shown as follows

ROTEM CAR (SOLID STOP) DEFLECTED CAR DIMENSIONS (DYNAMIC OUTLINE) RELATIVE TO DATUM		
POINT	HEIGHY ABOVE TOP OF RAIL (INCH)	WIDTH FROM TRACK CENTER (INCH)
4	3.12	41.84
5	7.06	41.84
6	7.06	64.84
7	15.64	65.74
8	68.96	72.70
9	122.27	79.67
10	143.35	81.62
11	161.05	83.19
12	166.28	82.95
13	178.89	77.87
14	187.07	67.01
15	195.58	34.03
16	198.25	0

ITEM	ROTEM CAR (solid stop except the primary and bolster roll)	UNIT
1.outline at the roof		
new 33 inch diameter wheels	33	inch
secondary air springs over-inflated to vertical stops	2.25	inch
2.outline at the side		
maximum wheel-rail clearance resulting from track widening and flange wear	1.37	inch
primary suspension lateral play (maximum)	0.17	inch
primary suspension roll calculated for a stationary car on a track with 6 inches of unbalanced superelevation(AW3) relative to track	2.218	degree
lateral travel of the bolster to hard stops	2.78	inch
bolster roll angle relative to bogie	0.663	degree
secondary roll to the upstop on one side and the downstop on the other relative to bolster	3.091	degree
upstop	2.25	inch
down stop(AW3)	2.50	inch
3.outline at the truck		
maximum uncompensated wheel wear	0.50	inch
primary suspension deflection resulting from an AW3 load	0.62	inch

기호 MARK	일자 DATE	변경내역 DETAIL OF REVISION(E.C ZONE)	설변번호 E.C NO.	설계 DGN	검도 CHK	승인 APP
A	2007.8.28	ANTENNAS(GPS,RADIO),EMERGENCY BOX WERE RELOCATED REAR VIEW MIRROR,SILL STEP WERE MODIFIED	Not applied	V.H.CHOI	V.H.CHOI	K.W.LEE

승인 APP	K.W.LEE 2007.08.28
검도 CHK	K.W.LEE 2007.08.28
설계 DGN	W.H.CHOI 2007.08.28
제도 DRG	W.H.CHOI 2007.08.28
재질 MAT'L	
중량	G.W
TITLE	Vehicle Dynamic outline
DRG. NO	GAP00600
Ver. / Rev.	-A
SCALE	1/10
SHEET	2 of 2
SIZE	D

CATIA

Appendix E

Request for Special Design Consideration Form

The following Request for Special Design Consideration Form DPM-13 shall be used to submit requests for variances to SCRRA criteria.

METROLINK

REQUEST FOR SPECIAL DESIGN CONSIDERATION FORM

Project Name: _____ Location: _____

Project No.: _____ Contract No.: _____

Date: _____ Reference No.:_____ Revision:_____

Part 1: To be Completed by Originator

ORIGINATOR	Requested by: _____ Title: _____ Company: _____ Signature: _____ Print Name: _____	
IMPACTS	Does this Special Design Consideration impact Safety and Operations? Does this Special Design Consideration impact Positive Train Control? Does this Special Design Consideration conflict with any CPUC/CA MUTCD regulations and requirements? Does this Special Design Consideration impact economic, social or environmental issues?	☐ Yes ☐ No ☐ Yes ☐No ☐ Yes ☐No ☐ Yes ☐No
SPECIAL DESIGN CONSIDERATION INFORMATION	Does this Special Design Consideration affect the following? Engineering Standards ☐ Yes ☐ No Specifications ☐ Yes ☐ No Design Criteria ☐ Yes ☐ No Manual Section ☐ Yes ☐ No	
	Description of Special Design Consideration: *(include location, extent of impact, affect on other operations)*	

	Rational for Special Design Consideration: *(include explanation as to impracticality of compliance with SCRRA standards/criteria/instructions and demonstrate all attempts to comply)*
	Mitigation Measures: *(describe how purpose/intent of SCRRA standards/criteria/instructions will attempt to be met by alternative means)*
REASON FOR REQUEST	**Request for Special Design Consideration must address the following:** • Established Design Criteria versus proposed and existing criteria • Reason the appropriate design criteria cannot be met • Justification for the proposed Criteria • Any background information which documents, support or justify the request • Any mitigation that will be provided to further support or justify the request • Safety implication of the request • The comparative cost of the full standard versus the lower design being proposed. Show what it would cost to met the standard for which the Special Consideration is requested • Long term effect of the reduced design as compared to the full standard
ATTACHMENTS	The completed Request for Special Design Consideration Form and all supporting documentation (drawings, reports, and calculations) shall be submitted with all requests for Special Design Considerations. This form (at the end of the last page) and all documentation attached with the request must be stamped and sealed by a Registered California Engineer. **List all attachments:**

Part 2: SCRRA approval Signatures

SCRRA RESPONSE	☐ Approved	*Additional SCRRA requirements upon which approval is granted:*
	☐ Resubmit	*Additional justification, explanation or information required:*
	☐ Rejected	*Reason:*

Part 3: SCRRA approval Signatures

	Name	**Date**
SCRRA APPROVALS	Assistant Director, Public Projects	
	Assistant Director, Standards and Design	
	Assistant Director, PTC Technical Services	
	Director, System Safety	
	Director, Engineering and Construction	

Appendix F

SCRRA Replacement Structure Recommendation Form

The following SCRRA Replacement Structure Recommendation Form will be used when design is by a consultant. The consultant will use this form to present relevant data regarding the hydrology, existing structure hydraulics, and proposed structure hydraulics to the SCRRA engineering staff, as discussed in Chapter 8.0, Drainage and Grading, of this DCM.

REPLACEMENT STRUCTURE RECOMMENDATION FORM

☐ Br. ☐ Culv. ☐ Siph.	MP:	Subdivision:	
State:		County:	
Latitude:	° ‘ N	Longitude:	° ‘ W
Hydraulic Engineer:		Office:	
East Near Station:		Terminal Station:	
West Near Station:		Terminal Station:	

Date Assigned:		Date Presented:		Date Approved:	

SITE RECONNAISSANCE

Description of Existing Structure:

Date of Site Visit: Number of Tracks:

T/Rail Survey Req’d: ☐ Yes ☐ No Roadway/Cattle Pass: ☐ Yes ☐ No

Track Profile: ☐Uniform ☐Sag ☐Crest

Track Alignment: ☐Tangent ☐Curve Left ☐Curve Right

Structure Purpose: ☐ Equalizer ☐ Conveyance ☐ Irrigation

Skew Angles from a Normal to Track: Culvert: Bridge Abutments: Piers:

Bridge Abutments: ☐ Vertical ☐ Spill Slope ☐ Eroded ☐ Riprapped

Culvert Outlet: ☐ Projecting ☐ End Treatment ☐ Scoured ☐ Riprapped

Piers/Piling: ☐ Timber ☐ Steel ☐ Concrete ☐ Scoured ☐ Riprapped

Visual Characterization of Channel Bed & Banks Soil Type:

Stream: ☐ Flowing ☐ Dry ☐ Headcut D/S? (Height: _____)

Jurisdictional Waterway: ☐ Yes ☐ No Reason: ☐ Borrow Pit ☐ No Stream Connection

Approximate Water Depth at Ordinary High Water:

Evidenced by: ☐ Vegetation ☐ Detritus ☐ Other:

Observed Wetlands Areas: ☐Yes ☐No Description:

Relevant Hydraulic Structures: Upstream:

Downstream:

Adjacent RR Str(s):

Upstream Low Damage: Elevation:

Description:

Field Team Preliminary Recommendation (If Any):

Other Comments:

Stream Name: Blue Line on Quad: ☐ Yes ☐ No

USGS Quadrangle:

Methodology Name: ☐ Peak Flow ☐ Hydrograph Method

Total Drainage Area: Total Flow Length:

Average Slope: Total Time of Concentration:

No. of Subareas: Infiltration Method & Value:

Land Use: Percent Urbanized:

Design Storm Duration: Design Storm Distribution:

Design Storm Intensity- 50-yr: in/hr 100-yr: in/hr

Design Discharges:

Q_{50}	cfs
Q_{100}	cfs

Special Factors Influencing Hydrologic Response:

Other Comments:

EXISTING HYDRAULICS

Classification of Track: ☐ Mainline ☐ Other _____

Governing Criteria: Low Chord: ☐ 25-yr WSEL ☐ 50-yr WSEL

Subgrade: ☐ 50-yr EGL ☐ 100-yr EGL

Hydraulic Methodology: Datum:

Existing Bridge Piling Type and Size:

Bridge Backwalls: ☐ Vertical ☐ Sloping

Low Chord or Soffit Elev. At Lowest Point (Describe Location):

Base of Rail Elevation (Describe Location):

Upstream Face Channel/Culvert Invert Elevation:

Downstream Face Channel/Culvert Invert Elevation:

Controlling Subgrade Elevation Value: ☐ Computed ☐ Surveyed ☐ Design

Hydraulic Control Location: ☐ Upstream ☐ Downstream ☐ Mixed

Description of Control:

Water Surface Elevations:

Description	Section Number	50-Year		100-Year	
		Water Surface Elevation	Δ From Criteria*	Water Surface Elevation	Δ From Criteria*
Downstream					
U/S Face of D/S Str. (if any)					
Downstream Face (Repl.)					
Downstream Face (Exist.)					
Upstream Face (Exist.)					
Upstream Face EGL (Exist.)					
Upstream Face (Repl.)					
Upstream Face EGL (Repl.)					
U/S Face of U/S Str. (if any)					
Upstream					

Does Existing Structure Meet SCRRA Criteria: 50 YR ☐ Yes ☐ No 100-YR ☐ Yes ☐ No

Maximum Average Velocity at Structure (fps): 50-YR: 100-YR:

Is Structure in a FEMA Floodplain: ☐ Yes ☐ No In Floodway: ☐ Yes ☐ No

Floodplain Designation Zone:

Other Comments:

* Delta is found by subtracting the reference elevation (low chord, soffit, or subgrade) from the water surface elevation (i.e. negative indicates criterion is met).

RECOMMENDATION

Proposed Replacement Structure:

Special Considerations Identified in Developing Replacement:

Classification of Track: ☐ Mainline ☐ Other _____

Governing Criteria: Low Chord: ☐ 25-yr WSEL ☐ 50-yr WSEL

Subgrade: ☐ 50-yr EGL ☐ 100-yr EGL

Limiting Criterion: ☐ Low Chord ☐ Subgrade ☐ FEMA ☐ High Tailwater ☐ Other:

Variance from Criteria: Approved By:

Assumed Ties: ☐ Timber ☐ Concrete

Base of Rail Raise: ☐ Yes ☐ No Amount:

Replacement Low Chord or Soffit Elevation at Lowest Point:

Base of Rail at Lowest Point:

Controlling Subgrade Elevation:

Upstream Face Channel/Culvert Invert Elevation:

Downstream Face Channel/Culvert Invert Elevation:

Change in Invert Elevation: ☐ Yes ☐ No Amount:

Culvert Length: Culvert Cover at U/S Face:

Water Surface Elevations:

Description	Section Number	50-Year			100-Year		
		W.S. Elev.	Δ From Criteria	Δ From Existing	W.S. Elev.	Δ From Criteria	Δ From Existing
Downstream							
U/S Face of D/S Str.							
D/S Face (Repl.)							
U/S Face (Repl.)							
U/S Face EGL (Repl.)							
U/S Face of U/S Str.							
Upstream							

Impact to Low Damage Elevation:

Operation During Extreme Event:

Maximum Average Velocity at Structure (fps): 50-YR: 100-YR:

Change (+ -) from Existing (fps): 50-YR: 100-YR:

Require Channel Re-alignment: ☐ Yes ☐ No

Inlet/Outlet End-Treatment Assumed for Culvert Design: ☐ Yes ☐ No ☐ N/A

For Culvert Replacement, Will Culverts Fit Beneath Low Chord: ☐ Yes ☐ No ☐ N/A

Standard Bridge Abutment Stability Berms Used: ☐ Yes ☐ No ☐ N/A

Other Comments:

OTHER CONSIDERATIONS

Permits:

Probable COE Permit Type: COE Office:

Other Permits/Notifications:

Anticipated Permit Lead Time:

Preliminary Scour Analysis - 100 year:

Contraction Scour (ft):	
Long-Term Degradation (ft):	
Pier Scour (ft):	
Abutment Scour (ft):	
Worst Total Scour (ft):	

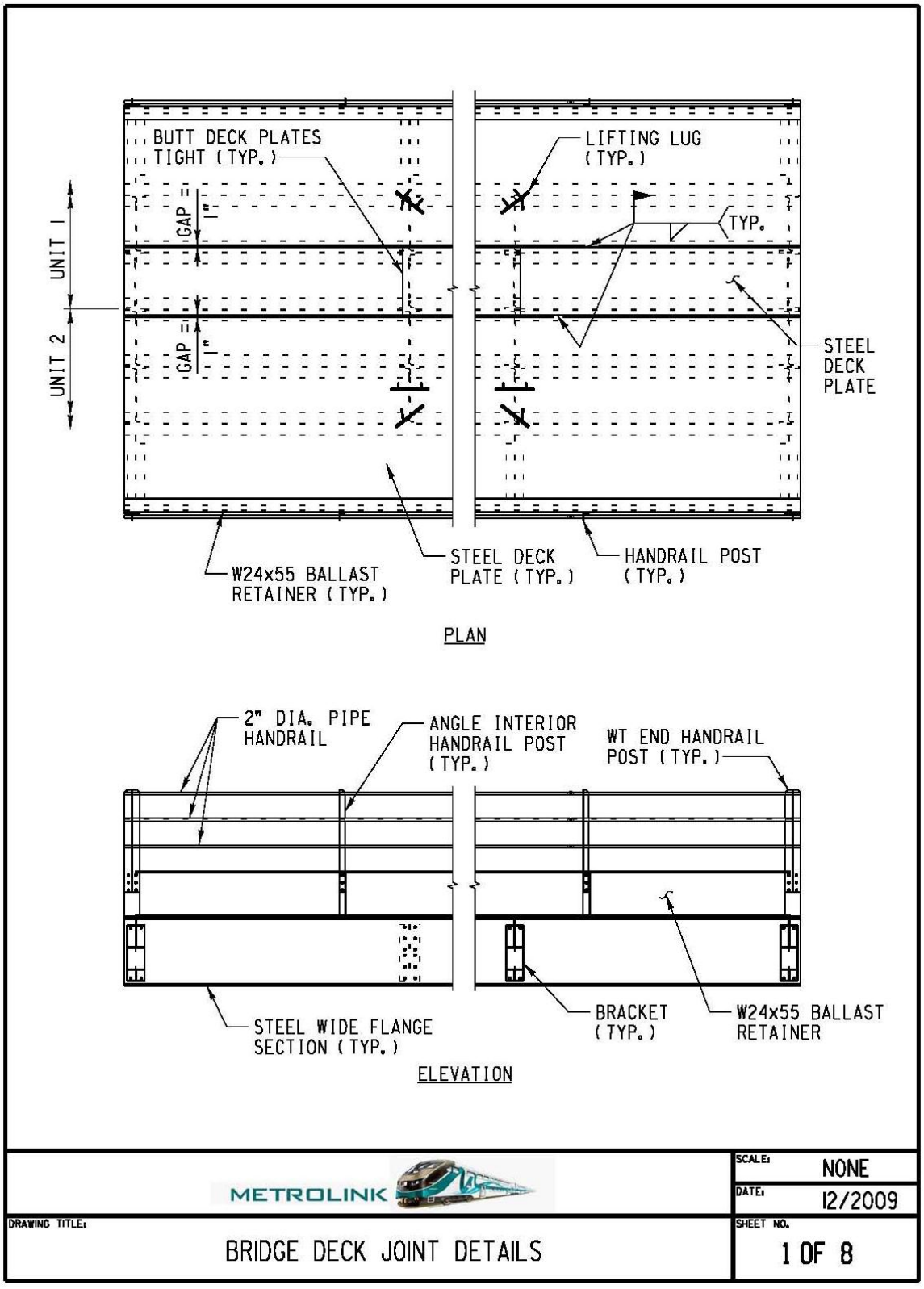
Recommended Downstream Outlet Bed/Channel Riprap:

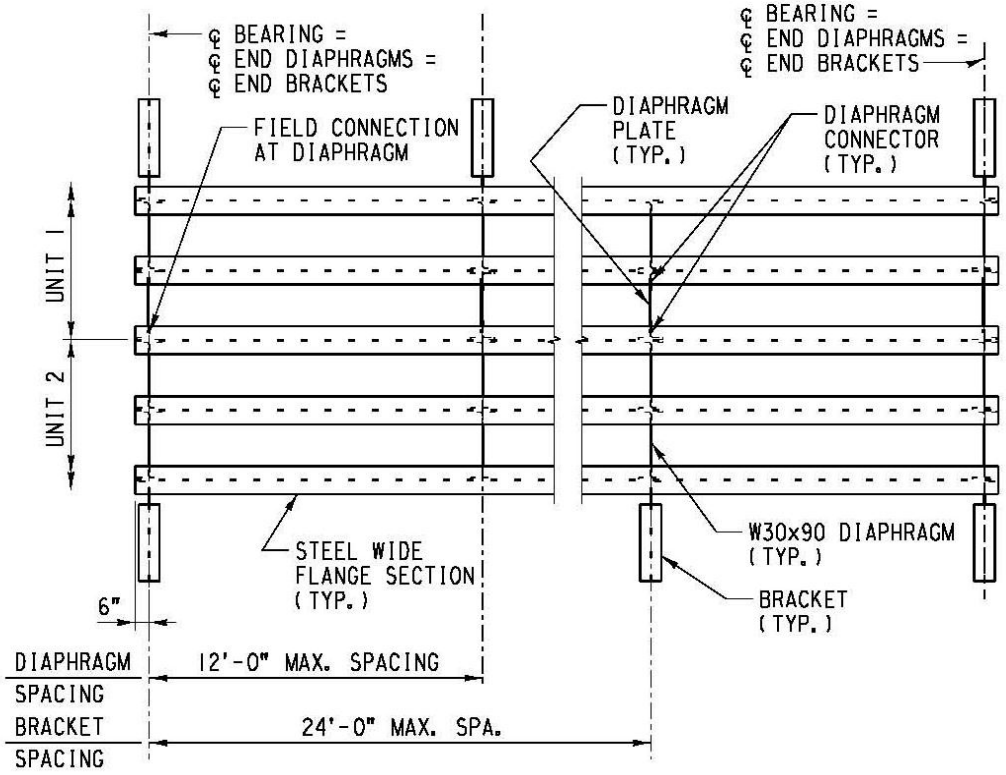
	SCRRA Type	Size Range	D_{50}	Thickness	Downstream Extent (ft)
100-YR Exit Velocity (fps):					
Abutment Spill Slope Erosion Protection:					N/A
Abutment Bed Scour Protection:					
Culvert Outlet Protection:					
☐ None	N/A	N/A	N/A	N/A	N/A
☐ Riprap Existing Bed & Banks					
☐ Pre-Formed Riprap Basin					
☐ Concrete Drop/Stilling Basin	N/A	N/A	N/A	N/A	N/A

SYNOPSIS

Appendix G

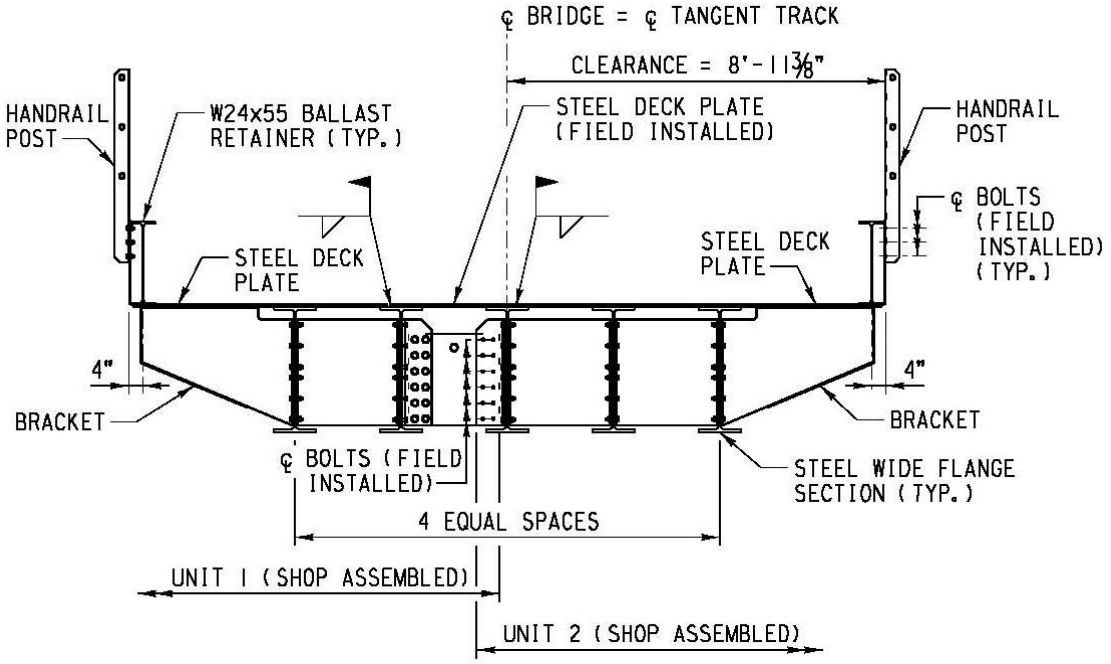
Typical Steel Beam Span Details


BUTT DECK PLATES TIGHT (TYP.)
LIFTING LUG (TYP.)
TYP.
UNIT 1
UNIT 2
GAP = 1"
GAP = 1"
STEEL DECK PLATE
W24x55 BALLAST RETAINER (TYP.)
STEEL DECK PLATE (TYP.)
HANDRAIL POST (TYP.)
PLAN
2" DIA. PIPE HANDRAIL
ANGLE INTERIOR HANDRAIL POST (TYP.)
WT END HANDRAIL POST (TYP.)
STEEL WIDE FLANGE SECTION (TYP.)
BRACKET (TYP.)
W24x55 BALLAST RETAINER
ELEVATION
METROLINK
SCALE: NONE
DATE: 12/2009
DRAWING TITLE:
BRIDGE DECK JOINT DETAILS
SHEET NO.
1 OF 8

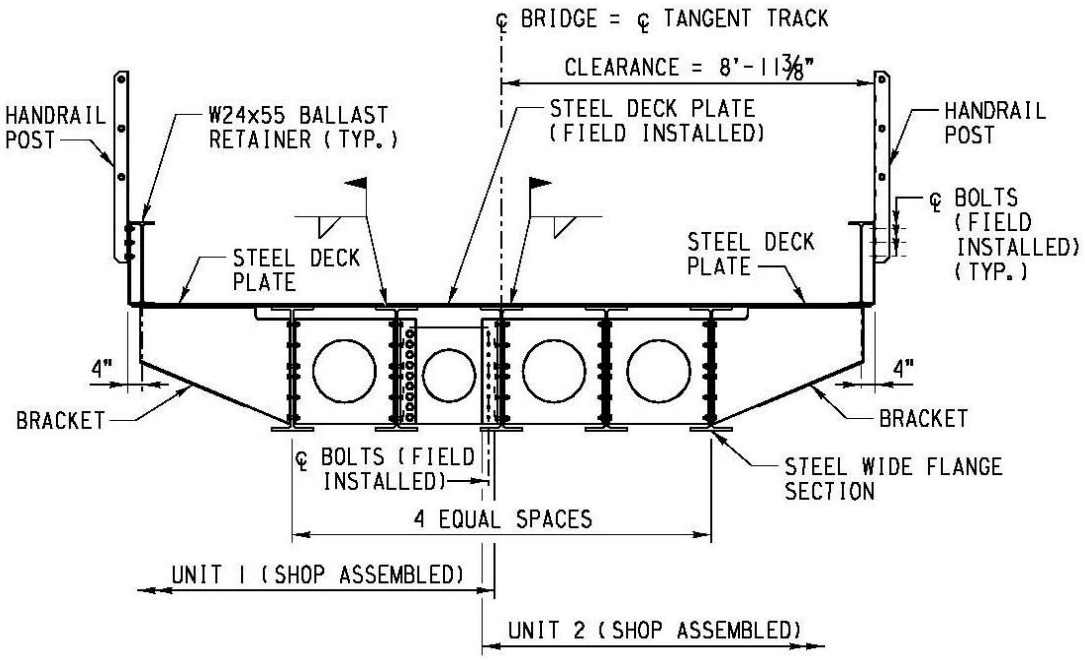


METROLINK

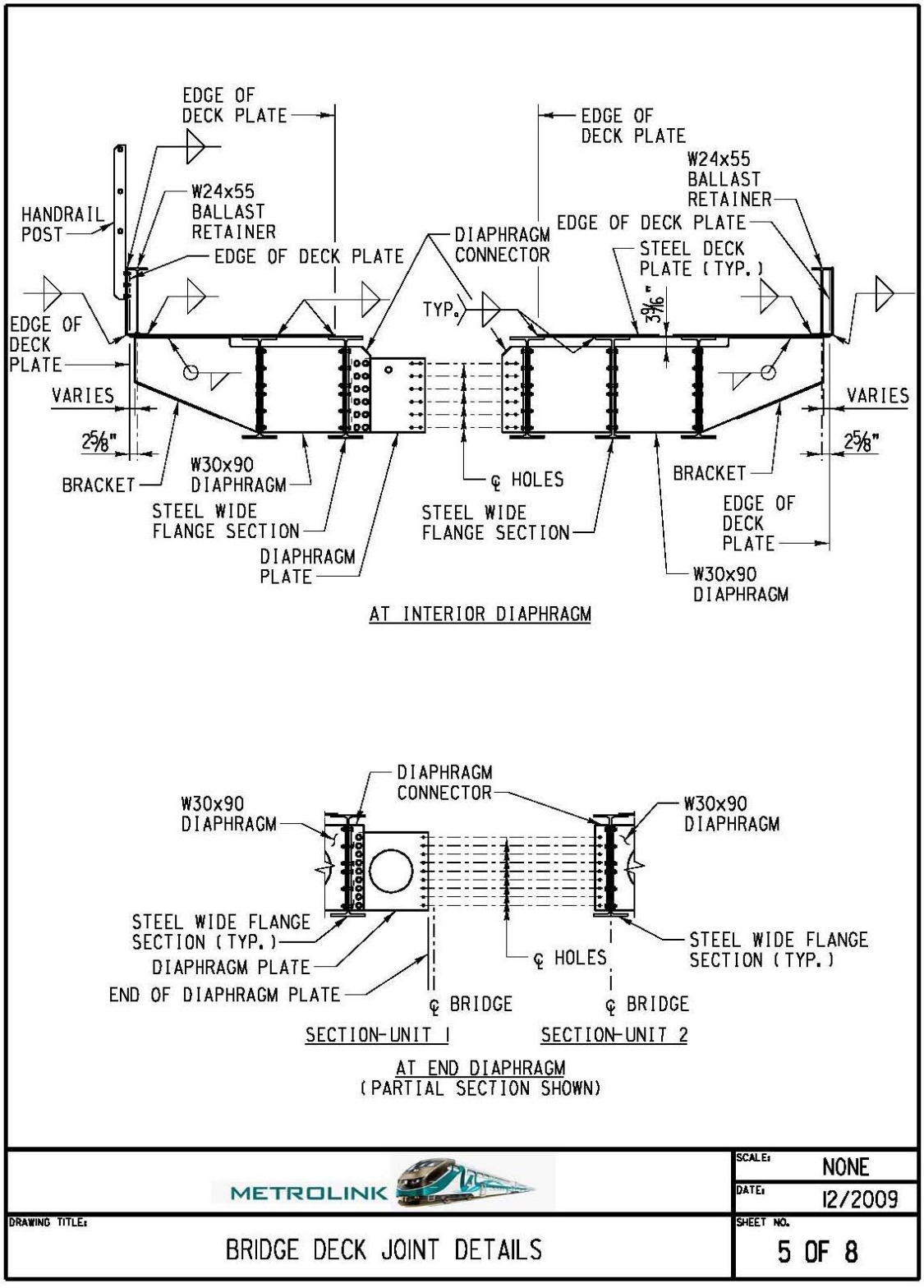
SCALE:	NONE
DATE:	12/2009
DRAWING TITLE: BRIDGE DECK JOINT DETAILS	SHEET NO. 2 OF 8



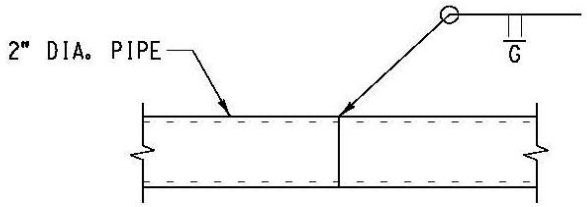
METROLINK	SCALE: NONE
	DATE: 12/2009
DRAWING TITLE: BRIDGE DECK JOINT DETAILS	SHEET NO. 3 OF 8



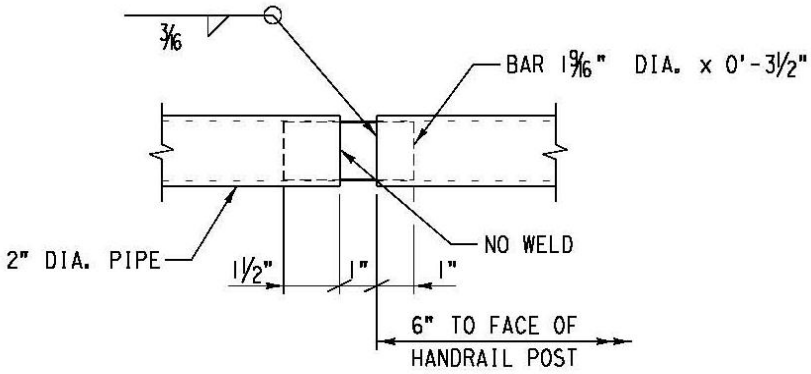
METROLINK	SCALE: NONE
	DATE: 12/2009
DRAWING TITLE: BRIDGE DECK JOINT DETAILS	SHEET NO. 4 OF 8



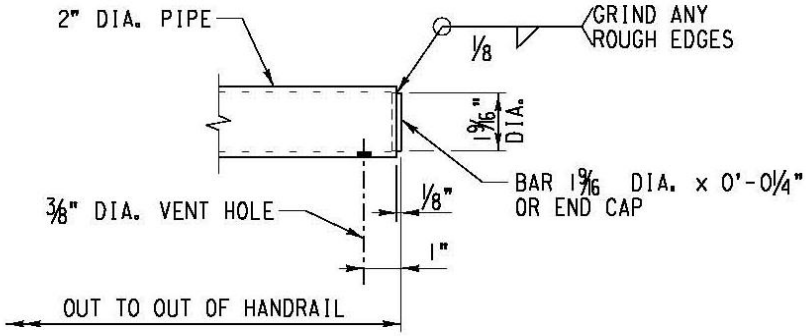
METROLINK	SCALE: NONE
	DATE: 12/2009
DRAWING TITLE: BRIDGE DECK JOINT DETAILS	SHEET NO. 5 OF 8



SHOP SPLICE

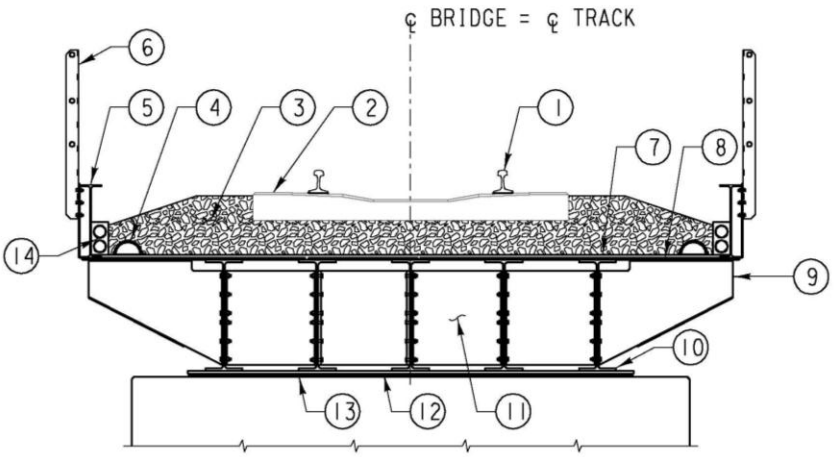


FIELD SPLICE



END CLOSURE

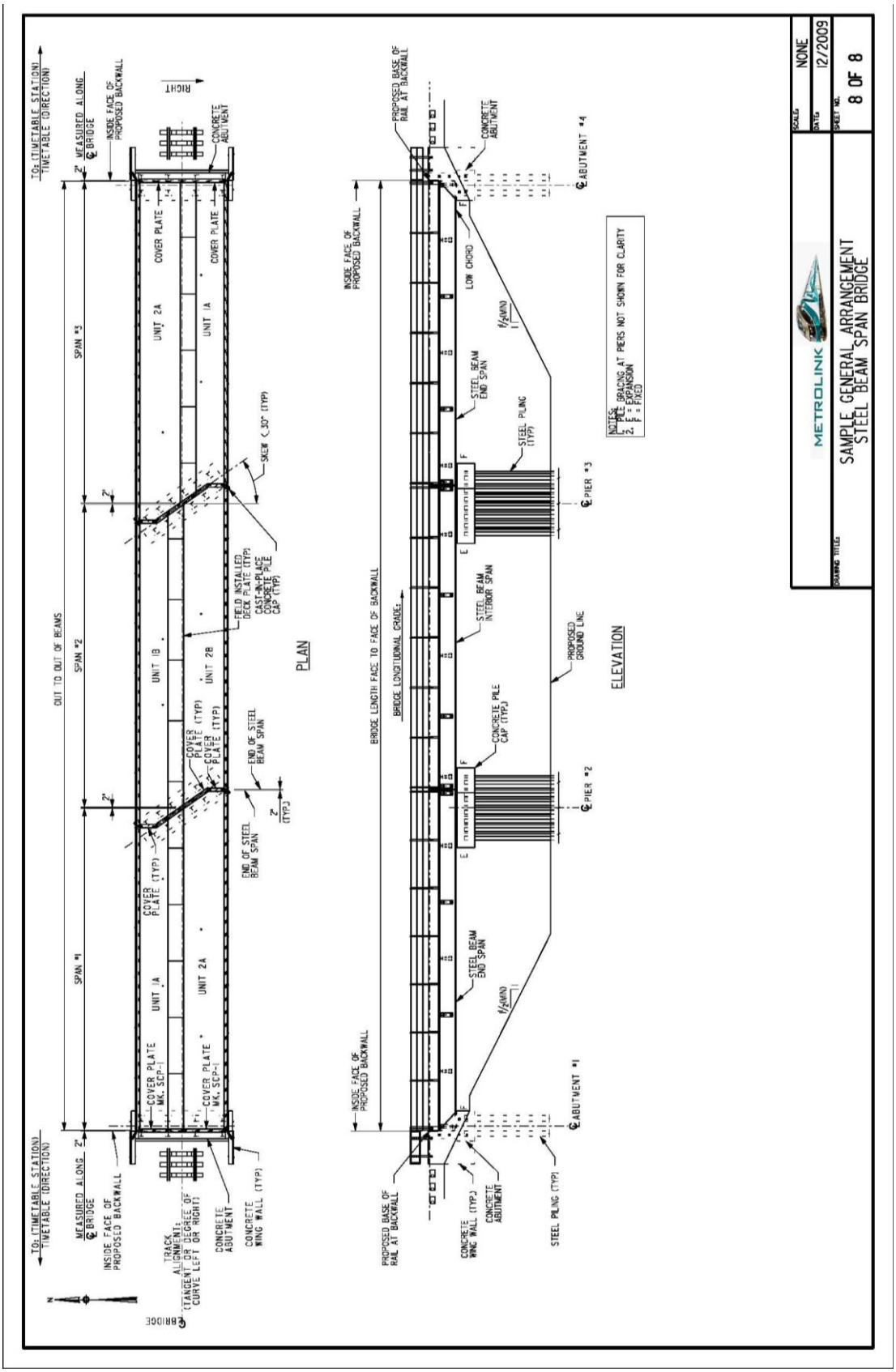
METROLINK	SCALE: NONE
	DATE: 12/2009
DRAWING TITLE: BRIDGE DECK JOINT DETAILS	SHEET NO. 6 OF 8



1. RAIL
2. CONCRETE TIE w/BOTTOM NEOPRENE PAD
3. BALLAST
4. DRAIN
5. BALLAST RETAINER
6. HANDRAIL
7. WATERPROOFING
8. STEEL PLATE DECK
9. BRACKET
10. STEEL BEAM
11. DIAPHRAGM
12. SOLE PLATE
13. BEARING PAD
14. 2-4" I.D. GALVANIZED METAL CONDUIT EACH SIDE OF BRIDGE STRUCTURE

METROLINK

	SCALE: NONE
	DATE: 6/2010
DRAWING TITLE: BRIDGE DECK JOINT DETAILS	SHEET NO. 7 OF 8


PLAN
ELEVATION
SAMPLE GENERAL ARRANGEMENT
STEEL BEAM SPAN BRIDGE
METROLINK
SCALE: NONE
DATE: 12/2009
SHEET NO. 8 OF 8
DRAWING TITLE:
NOTES:
1. PILE BRACING AT PIERS NOT SHOWN FOR CLARITY
2. E = EXPANSION
F = FIXED
TO: (TIMETABLE STATION)
TIMETABLE (DIRECTION)
MEASURED ALONG ℄ BRIDGE
INSIDE FACE OF PROPOSED BACKWALL
RIGHT
CONCRETE ABUTMENT
SPAN #1
SPAN #2
SPAN #3
OUT TO OUT OF BEAMS
UNIT 1A
UNIT 2A
UNIT 1B
UNIT 2B
COVER PLATE (TYP)
COVER PLATE WKS. SCP-1
FIELD INSTALLED DECK PLATE (TYP)
CAST-IN-PLACE CONCRETE PILE CAP (TYP)
SKEW < 30° (TYP)
END OF STEEL BEAM SPAN
CONCRETE WING WALL (TYP)
TRACK ALIGNMENT: (TANGENT OR DEGREE OF CURVE LEFT OR RIGHT)
℄ BRIDGE
PROPOSED BASE OF RAIL AT BACKWALL
BRIDGE LENGTH FACE TO FACE OF BACKWALL
BRIDGE LONGITUDINAL GRADE:
℄ ABUTMENT #4
℄ ABUTMENT #1
℄ PIER #3
℄ PIER #2
LOW CHORD
STEEL BEAM END SPAN
STEEL BEAM INTERIOR SPAN
STEEL PILING (TYP)
CONCRETE PILE CAP (TYP)
PROPOSED GROUND LINE
STEEL PILING (TYP)

Appendix H

Bridge Longitudinal Force

AREMA specifies a longitudinal force to be applied to the bridge that simulates tractive effort or braking forces from a train passing over the bridge. The following equations are provided in AREMA:

- Braking Force: $LF = 45 + 1.2 \cdot L$ applied 8 ft above t/rail
- Traction Force: $LF = 25\sqrt{L}$ applied 3 ft above t/rail

  where L = is the length of the portion of the bridge under consideration, ft

The shear force applied to each substructure is determined by assuming that the bridge acts as a unit and each substructure will attract a portion of the total force based on its relative stiffness within the bridge (i.e., the substructures are considered springs acting in parallel, and each will deflect the same distance due to the force each attracts). Stiffness of each substructure is a function of material elasticity, shape properties, soil properties, clear height, pile batter, and abutment soil resistance.[1]

An example bridge is shown below:

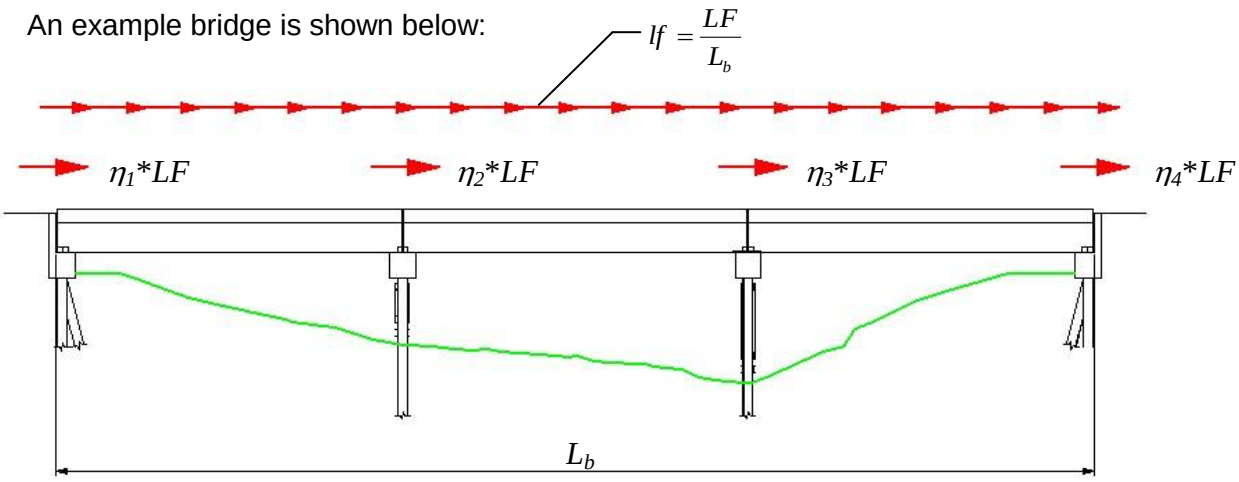


Figure 1

In the sketch above, the total longitudinal force is shown as a uniformly distributed lateral load. (The assumption on how the longitudinal force is distributed to the rail is not critical to determining the shear distribution, but is an essential step to calculating the moment effect on the substructures.) The shear force per substructure is then calculated by the following process:

[1] Expansion bearings utilizing rockers or sliding surfaces are assumed not to transfer any longitudinal load.

1. Calculate the stiffness, k_i, of each substructure. Account for all variables as mentioned above.
2. Determine the total stiffness of the structure, assuming the substructures act in parallel.
3. Determine the portion of the total longitudinal shear force resisted by each substructure, η_i, as:

$$\eta_i = \frac{k_i}{\sum_{1}^{i} k_i}$$

Bending moment due to the vertical reactions induced into the substructures by the longitudinal force is a result of the longitudinal load acting at a distance above the elevation of the superstructure bearings (8 ft or 3 ft above the top of rail + depth of the superstructure). The moment is passed into the caps by increasing or decreasing the vertical bearing reactions on the cap; because the CL of most bearings do not align with the CL of the cap, a force couple occurs at the bearing seat level (see Fig. 4) inducing a bending moment in the substructure. The following details the assumptions and derivation of the bending moment induced into the substructures by the longitudinal force.

1. The longitudinal load due to braking or traction is assumed to be applied to the bridge as a uniformly distributed shear force, acting 8 ft or 3 ft above the top of the rail. This shear force is passed from the train to the rail through friction between the wheels and the rail.
2. Due to the height of application (3 ft or 8 ft above the rail), a bending moment is assumed to be induced into the superstructure by a vertical force couple acting through train car wheel reactions. The free body diagram below shows the applied longitudinal force and the solved reactions on a car with the assumed dimensions.

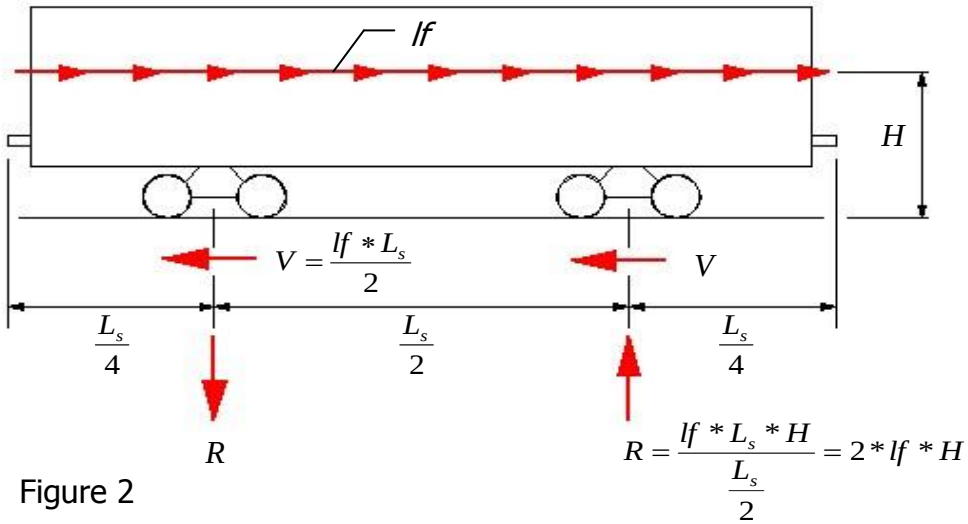


Figure 2

3. At this point, due to the variability of the train's positioning on the bridge, it is logical to separate the bending moment effects due to the longitudinal force into two parts:

bending moment due to the longitudinal force acting at a distance, H, above the top of the rail, and the bending moment due to the longitudinal force acting at the top of the rail through the superstructure.

Bending Moment Due to the Longitudinal Force Acting at the Top of the Rail Through the Superstructure:

1. The free body diagram of the longitudinal shear force acting at the top of the rail is shown below. Equating forces and summing moments yields the bearing reactions, R, at each end of the span. The depth of the span, d_s, is the height between the top of the rail and the top of the cap/bottom of the bearing.

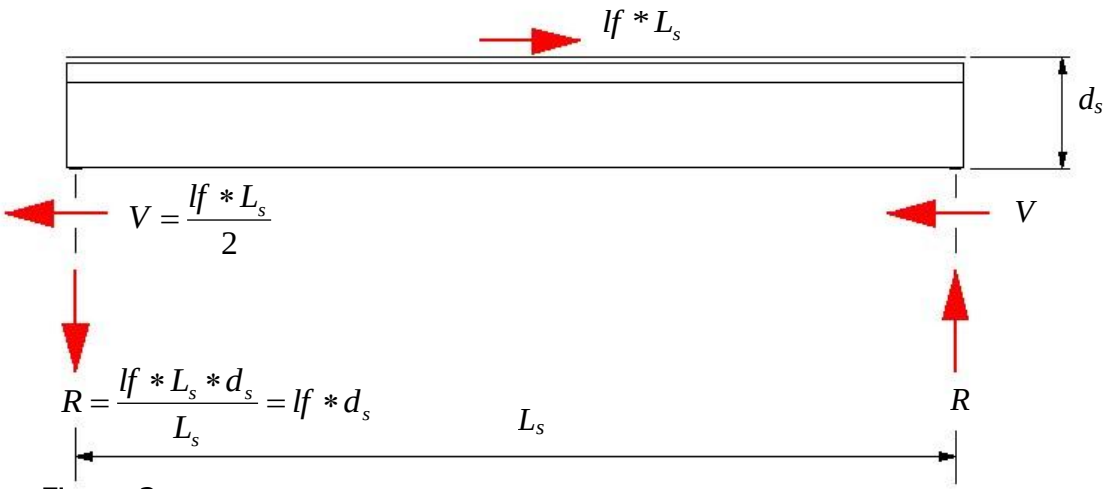


Figure 3

2. The next free body diagram depicts the pier cap below the right bearing of the span above. The adjacent span to the right of the span in the prior figure is assumed to be the same length as the span span (L_s), thus having the same fbd as seen above.
3. The bending moment due to the vertical reactions induced by the longitudinal force transferring from the top of the rail to the top of the cap is given by the following equation. Note that this moment acts in a direction that counteracts the direction of the shear force.

$$M = 2 * R * d_b = 2 * lf * d_s * d_b$$

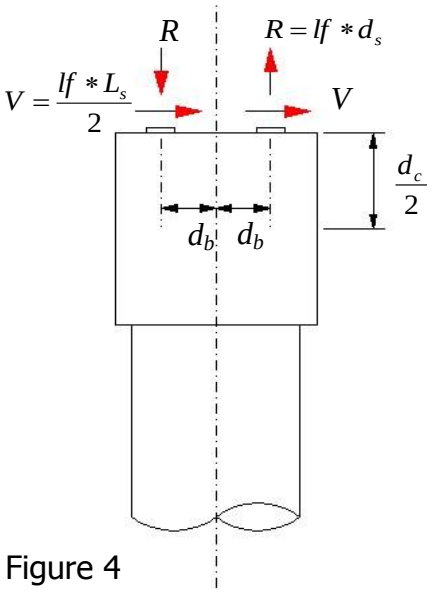


Figure 4

At this point, the longitudinal force has been applied a distance above the top of the rail (8 ft or 3 ft) and the shear force has been carried down to the substructure units. In addition, the bending moment caused by the longitudinal force moving from the top of the rail to the top of the cap has been estimated. What remains is to determine the bending effect on the cap from the application of the longitudinal force being applied at a distance above the top of the rail.

Bending Moment Due to the Longitudinal Force Acting at a Distance Above the Top of the Rail:

1. Starting with the free body diagram in Figure 2, a related free body diagram can be drawn for the span directly beneath it, as seen in Figure 5. The shear forces have been neglected, as they have already been accounted for in the prior moment derivation.

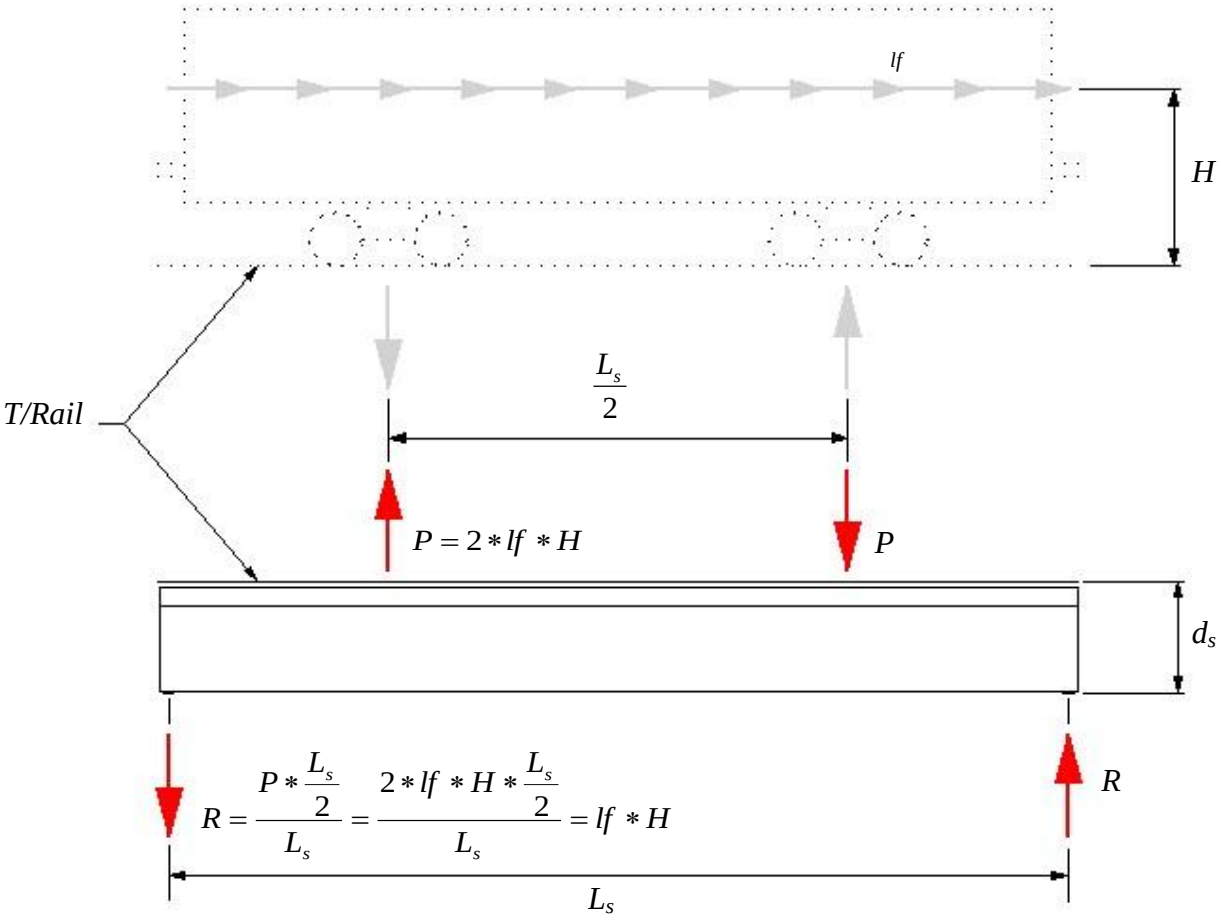


Figure 5

2. Focusing on the pier cap below the right bearing of the span in Figure 5, a free body diagram similar to Figure 4 can be drawn. In this case however, the bearing reactions, R, are as shown in Figure 5. This results in the following bending moment induced on the cap:

$$M = 2 * R * d_b = 2 * lf * H * d_b$$

3. The direction of this bending moment now depends on the placement of the train car. If the train cars are centered in the span, the bending moment will act to counteract the shear force (i.e., same direction as the bending moment induced by the shear force moving through the superstructure. However, if the train cars are centered over the pier, the bending moment direction will reverse and act to produce deflection in the same direction as the shear force.

Because of this moment direction reversal, it has been decided to conservatively assume all bending moments act to produce deflection in the same direction as the shear force. Therefore, the total load applied to the c.g. of the cap would be as follows:

$$V_i = \eta_i * LF$$

$$M_i = 2 * \frac{LF}{L_b} * (H + d_s) * d_b + V_i * \frac{d_c}{2}$$

where: η_i = percentage of the total longitudinal force attracted by substructure i,
LF = total longitudinal force applied to the bridge,
L_b = total length of the bridge,
H = height of longitudinal force above top of rail (3 ft or 8 ft),
d_s = distance between top of rail and top of cap,
d_b = distance between CL bearing and CL cap,
d_c = height of cap,
V_i = longitudinal force shear applied to the substructure, and
M_i = longitudinal force bending moment applied to the substructure.

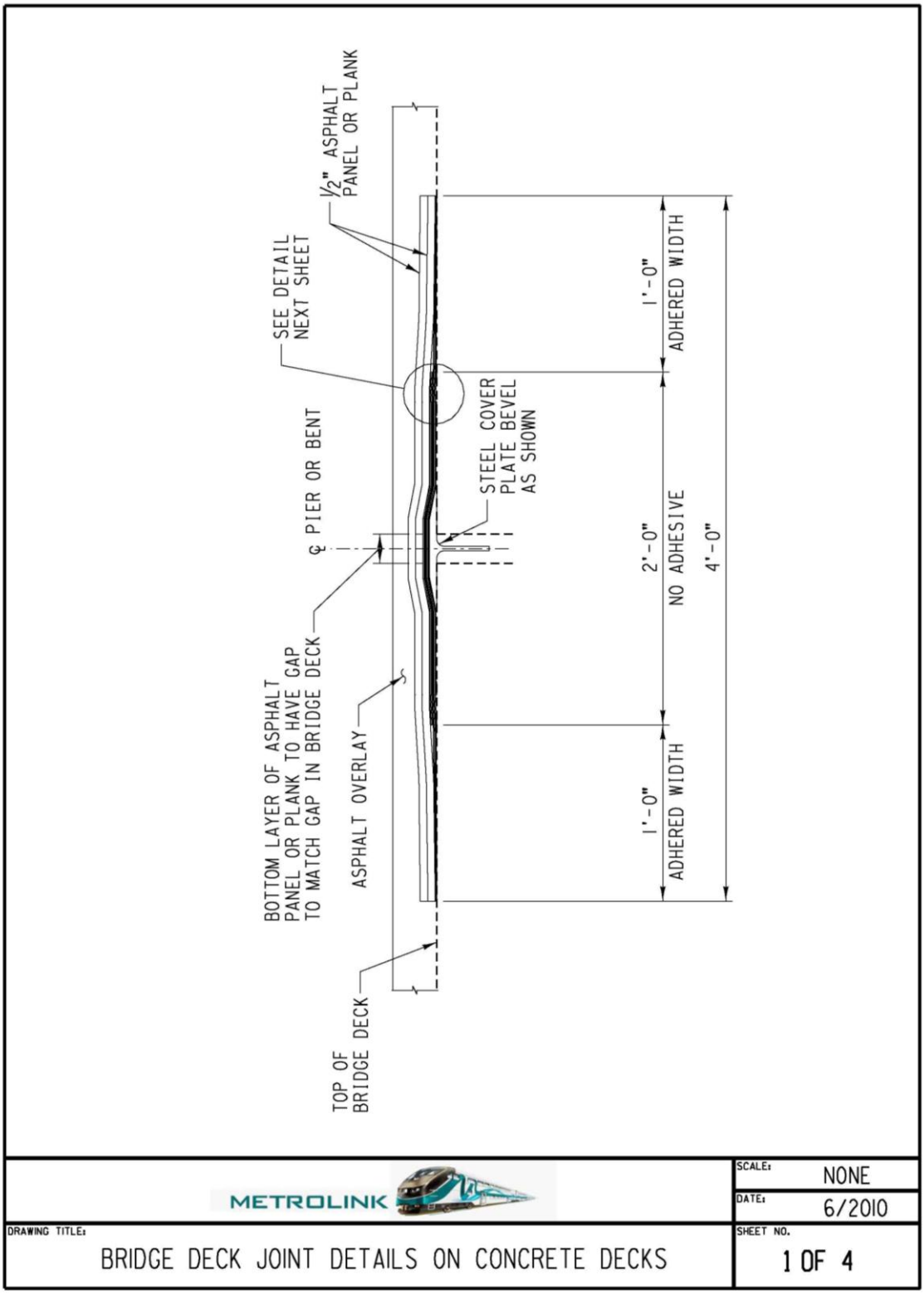
Load Application From Train Through Superstructure to Substructure

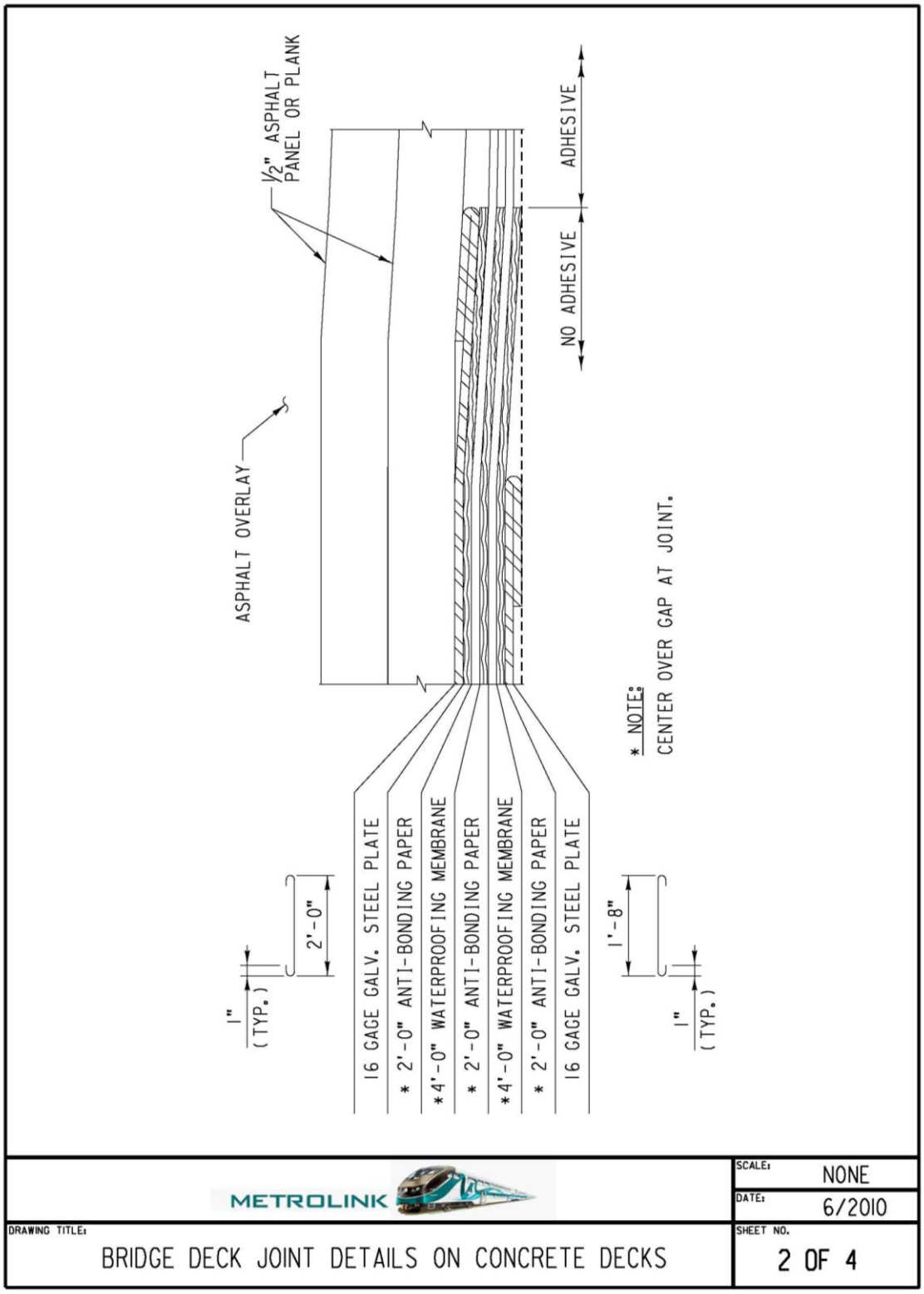
As detailed above, the magnitude of the design shear and moment due to longitudinal force will be determined as shown. When following this procedure, some substructures will attract load that is applied several spans away, thus forcing the load to be transferred through the superstructure and either from superstructure span to superstructure span through compression of the joint filler (where used for precast spans) or from superstructure span through the bearings into the pile cap back through the bearings into the next span and so on until reaching the substructure element that resists the load. Force transfer can also be assumed to occur through the rails.

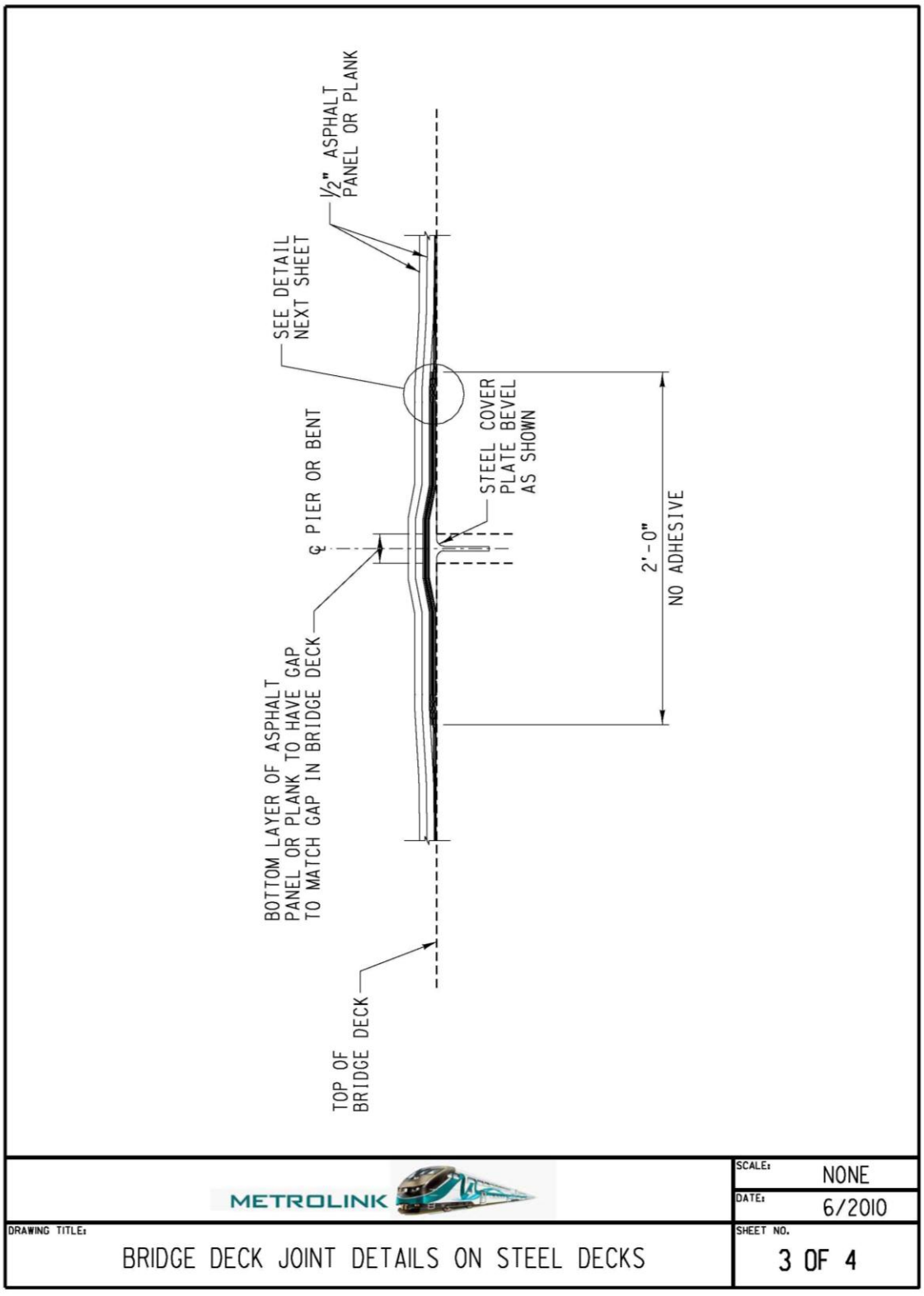
The design calculations should include a sketch of a longitudinal force diagram that documents the total force applied longitudinally to the bridge and the fraction of the total force resisted at each substructure element. The calculations should also describe how the force is transferred between the superstructure and each substructure element, and include a diagram or table indicating the fraction of the load carried at each substructure element by each bearing, connection, and by the rail.

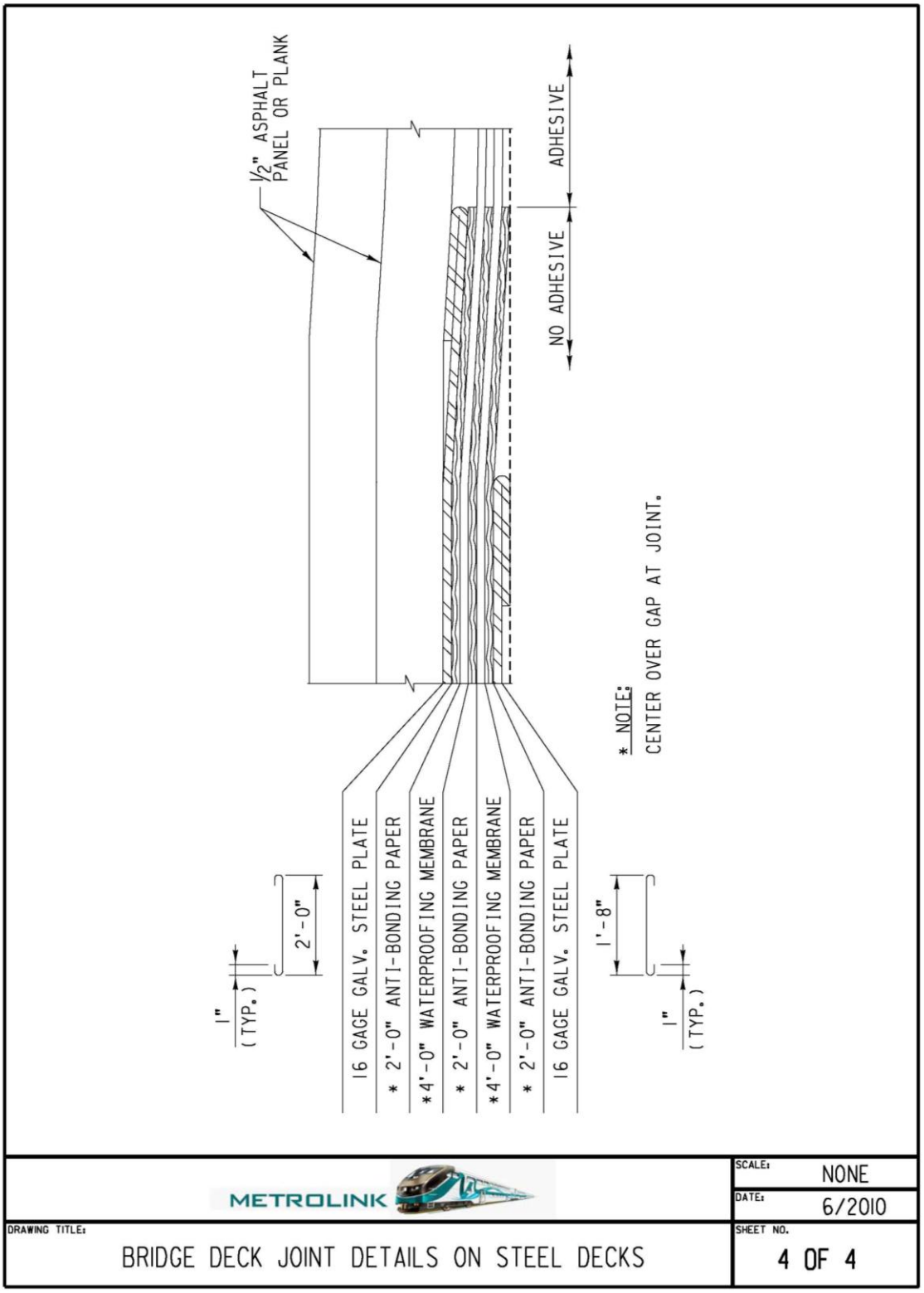
Appendix I

Waterproofing at Bridge Deck Joints


½" ASPHALT PANEL OR PLANK
SEE DETAIL NEXT SHEET
℄ PIER OR BENT
STEEL COVER PLATE BEVEL AS SHOWN
BOTTOM LAYER OF ASPHALT PANEL OR PLANK TO HAVE GAP TO MATCH GAP IN BRIDGE DECK
ASPHALT OVERLAY
TOP OF BRIDGE DECK
1'-0" ADHERED WIDTH
2'-0" NO ADHESIVE
1'-0" ADHERED WIDTH
4'-0"
METROLINK
SCALE: NONE
DATE: 6/2010
DRAWING TITLE:
BRIDGE DECK JOINT DETAILS ON CONCRETE DECKS
SHEET NO.
1 OF 4


½" ASPHALT PANEL OR PLANK
ADHESIVE
NO ADHESIVE
ASPHALT OVERLAY
* NOTE:
CENTER OVER GAP AT JOINT.
16 GAGE GALV. STEEL PLATE
* 2'-0" ANTI-BONDING PAPER
*4'-0" WATERPROOFING MEMBRANE
* 2'-0" ANTI-BONDING PAPER
*4'-0" WATERPROOFING MEMBRANE
* 2'-0" ANTI-BONDING PAPER
16 GAGE GALV. STEEL PLATE
2'-0"
1" (TYP.)
1'-8"
1" (TYP.)
METROLINK
SCALE: NONE
DATE: 6/2010
DRAWING TITLE:
BRIDGE DECK JOINT DETAILS ON CONCRETE DECKS
SHEET NO.
2 OF 4


½" ASPHALT PANEL OR PLANK
SEE DETAIL NEXT SHEET
℄ PIER OR BENT
STEEL COVER PLATE BEVEL AS SHOWN
2'-0" NO ADHESIVE
BOTTOM LAYER OF ASPHALT PANEL OR PLANK TO HAVE GAP TO MATCH GAP IN BRIDGE DECK
TOP OF BRIDGE DECK
METROLINK
SCALE: NONE
DATE: 6/2010
DRAWING TITLE:
BRIDGE DECK JOINT DETAILS ON STEEL DECKS
SHEET NO.
3 OF 4


½" ASPHALT PANEL OR PLANK
ADHESIVE
NO ADHESIVE
* NOTE:
CENTER OVER GAP AT JOINT.
16 GAGE GALV. STEEL PLATE
* 2'-0" ANTI-BONDING PAPER
*4'-0" WATERPROOFING MEMBRANE
* 2'-0" ANTI-BONDING PAPER
*4'-0" WATERPROOFING MEMBRANE
* 2'-0" ANTI-BONDING PAPER
16 GAGE GALV. STEEL PLATE
2'-0"
1" (TYP.)
1'-8"
1" (TYP.)
METROLINK
SCALE: NONE
DATE: 6/2010
DRAWING TITLE:
BRIDGE DECK JOINT DETAILS ON STEEL DECKS
SHEET NO.
4 OF 4

Appendix J

SCRRA Notice of Exemption/Statutory Exemption

Notice of Exemption

Appendix E

To: Office of Planning and Research
P.O. Box 3044, Room 113
Sacramento, CA 95812-3044

County Clerk
County of: Los Angeles
12400 Imperial Highway
Norwalk, CA 90650

From: (Public Agency): Southern California Regional Rail Authority (SCRRA)
1 Gateway Plaza, 12th Floor
Los Angeles, CA 90012
(Address)

Project Title: Southern California Regional Rail Authority Projects

Project Applicant: Southern California Regional Rail Authority (SCRRA)

Project Location - Specific:
See Figure 1, attached.

Project Location - City: See Figure 1, attached. Project Location - County: Counties of Los Angeles, Ventura, San Bernardino, Riverside, Orange and San Diego

Description of Nature, Purpose and Beneficiaries of Project:

See Attachment A, Project Description

Name of Public Agency Approving Project: Southern California Regional Rail Authority (SCRRA)

Name of Person or Agency Carrying Out Project: SCRRA

Exempt Status: **(check one):**

- ☐ Ministerial (Sec. 21080(b)(1); 15268);
- ☐ Declared Emergency (Sec. 21080(b)(3); 15269(a));
- ☐ Emergency Project (Sec. 21080(b)(4); 15269(b)(c));
- ☐ Categorical Exemption. State type and section number: _____
- ☒ Statutory Exemptions. State code number: CEQA Guidelines 15275(a). Specified mass transit project; Public Resources Code Reference: Section 21080(b)(10)

Reasons why project is exempt:
The project institutes commuter rail service on existing rail rights-of-way currently in use. According to sections 21080(b)(10) and 15275(a) of CEQA, the institution of commuter rail services on rail rights-of-way already in use are exempt from regulations of CEQA.

Lead Agency Contact Person: Don O. Del Rio Area Code/Telephone/Extension: 213-452-0331

If filed by applicant:
1. Attach certified document of exemption finding.
2. Has a Notice of Exemption been filed by the public agency approving the project? ☒ Yes ☐ No

Signature: [signature] Date: 5-22-14 Title: CEO

☒ Signed by Lead Agency ☐ Signed by Applicant

Authority cited: Sections 21083 and 21110, Public Resources Code.
Reference: Sections 21108, 21152, and 21152.1, Public Resources Code.

Date Received for filing at OPR: _____

THIS NOTICE WAS POSTED
ON June 26 2014
UNTIL July 28 2014
REGISTRAR – RECORDER/COUNTY CLERK

2014 173222
FILED
Jun 26 2014
Dean C. Logan, Registrar – Recorder/County Clerk
Electronically signed by [illegible]

Revised 2011

METROLINK
Southern California Regional Rail Authority

Attachment A
Amendment to Notice of Exemption
Southern California Regional Rail Project

Description of Nature, Purpose, and Beneficiaries of Project:

This is an amendment to the previously filed Notice of Exemption by Southern California Regional Rail Authority (SCRRA) adopted on September 13, 1991, approving construction, modification, and operations of commuter rail facilities under a California Statutory Exemption. Due to changes since approval of the existing Notice of Exemption and the build out of the Metrolink Commuter Rail System, this amendment is filed to update the original Notice to account for regulatory changes, references, and route maps that developed since the original agreement was approved in 1991.

The descriptions of the proposed projects remain the same as in the original NOE and include the construction, modification, and operation of commuter rail facilities within existing railroad rights-of-way owned by the Southern California Regional Rail Authority member agencies, Los Angeles County Metro Transit Authority, Ventura County Transportation Commission, San Bernardino County Associated Governments, Riverside County Transportation Commission, Orange County Transportation Authority, and North County Transit District.

A map of the Metrolink System commuter rail lines is included in Figure 1 and shows the following routes:

1) Ventura County Line from East Ventura to Los Angeles Union Station (LAUS);

2) Antelope Valley Line from Lancaster to LAUS;

3) San Bernardino Line from San Bernardino to LAUS;

4) Pasadena Subdivision from Pomona to Irwindale;

5) Orange County Line from Oceanside to LAUS on BNSF Railway Company's (BNSF) San Bernardino Subdivision and on SCRRA's Orange and River Subdivisions;

2014 173222
FILED
Jun 26 2014

Page 1 of 2

METROLINK
Southern California Regional Rail Authority

6) Riverside Line from Downtown Riverside to LAUS on Union Pacific Railroads (UPRR)'s Los Angeles Subdivision;

7) Inland Empire - Orange County Line from San Bernardino to Oceanside along BNSF's San Bernardino Subdivision, and SCRRA's Olive and Orange Subdivisions;

8) Perris Valley Line from South Perris to Downtown Riverside (service begins in 2015);

9) Redlands Branch from Redlands to San Bernardino (future planned service);

10) 91 Line from Downtown Riverside to LAUS along BNSF's San Bernardino Subdivision and SCRRA's River Subdivision.

The projects also include Metrolink's Central Maintenance Facility north of downtown Los Angeles, the Eastern Maintenance Facility in Colton, and layover facilities in the Cities of Moorpark, East Ventura, Lancaster, Anaheim, San Bernardino, Oceanside and South Perris. The locations of these facilities are also shown on the System Map in Figure 1.

The goal of the project remains the same as stated in the original NOE to simultaneously improve regional mobility and air quality by reducing automobile trips. The beneficiaries include commuters who use the rail service, persons travelling on streets and highways who experience less traffic congestion and delay, and persons residing in the South Coast Air Basin who benefit from improved air quality.

2014 173222
FILED
Jun 26 2014
Dean C. Logan, Registrar – Recorder/County Clerk
Electronically signed by MONIQUE DAVIS

FIGURE 1

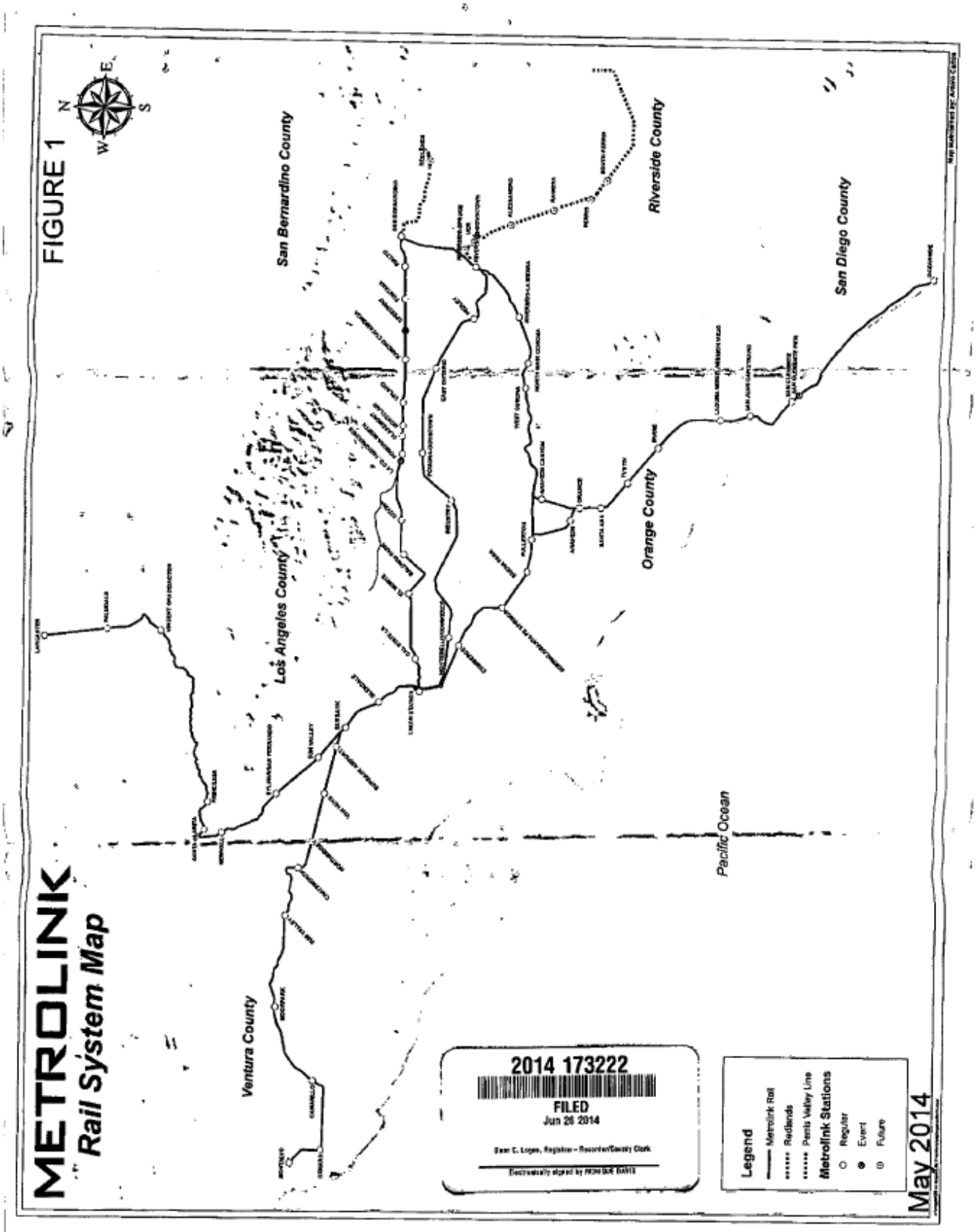

San Bernardino County
Riverside County
San Diego County
Los Angeles County
Orange County
Ventura County
Pacific Ocean
METROLINK
Rail System Map
May 2014
2014 173222
FILED
Jun 26 2014
Legend
Metrolink Rail
Redlands
Perris Valley Line
Metrolink Stations
Regular
Event
Future

EXHIBIT F
SHEET 1 of 4

SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY

NOTICE OF EXEMPTION

ORIGINAL REC'D
SEP 18 1991
COUNTY CLERK
BY D. Coleman DEPUTY

To: County Clerk
County of Los Angeles
111 North Hill Street
Los Angeles, CA 90012

Subject: Filing of Notice of Exemption for Southern California Regional Rail Authority Commuter Rail (SCRRA) System

Contact Person: Richard Stanger

Project Location: Counties of Los Angeles/San Bernardino/ Orange/Ventura/Riverside/San Diego

Attached is an action of the Southern California Regional Rail Authority adopted on September 13, 1991 approving the Project and authorizing this Notice of Exemption.

CERTIFICATION

The undersigned, duly qualified Executive Director of the SCRRA certifies that the attached memo to the SCRRA dated September 13, 1991 and this Notice of Exemption are true and correct copies of the action adopted at a legally convened meeting of the SCRRA Commission held on September 13, 1991.

APPROVED: Richard Stanger for RICHARD STANGER
Executive Director — Date 9/17/91

ATTEST: Lorraine Host
LORRAINE HOST
Secretary — Date 9/17/91

APPROVED AS TO FORM:

DE WITT W. CLINTON
County Counsel

Nina W Phillips
NINA W. PHILLIPS
Senior Deputy County Counsel

2014 173222
FILED
Jun 26 2014
Dean C. Logan, Registrar-Recorder/County Clerk
Electronically signed by MONTAE DAVIS

SHEET 2 of 4

NOTICE OF EXEMPTION

To: X Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

From: Southern California Regional Rail Authority

X County Clerk
County of Los Angeles
111 N. Hill Street
Los Angeles, CA 90012

2014 173222
FILED
Jun 25 2014
Dean C. Logan, Registrar - Recorder/County Clerk
Electronically signed by MONIQUE DAVIS

Project Title: Southern California Regional Rail Project

Project Location - Specific: See Figure 1 attached.

Project Location - City: See Figure 1 attached.
Project Location - County: Counties of Los Angeles, Ventura, San Bernardino, Riverside, Orange, and San Diego.

Description of Nature, Purpose, and Beneficiaries of Project: The proposed project includes the construction and operation of commuter rail facilities within existing railroad rights-of-way in Los Angeles, Ventura, San Bernardino, Riverside, Orange and San Diego Counties. The proposed commuter rail lines are shown in Figure 1 and include: 1) Moorpark to Los Angeles Union Passenger Terminal (LAUPT) on the Southern Pacific Railroad Coast mainline; 2) Santa Clarita to LAUPT on the tracks of the Southern Pacific Railroad; 3) San Bernardino to LAUPT on the tracks of the Southern Pacific Railroad; 4) San Bernardino to LAUPT on the Santa Fe Pasadena subdivision and Southern Pacific Baldwin Park branch, Yuma Main line and State Street line; 5) Oceanside to LAUPT on the current route of Amtrak's San Diego service and the tracks of the Santa Fe Railway; 6) Riverside to LAUPT on the San Jacinto and San Bernardino Subdivisions of the Santa Fe Railway; 7) San Bernardino to Irvine on existing Santa Fe railroad rights-of-way; 8) Hemet to Riverside on the San Jacinto branch of the Santa Fe Railway; 9) Redlands to San Bernardino on an existing Santa Fe Railway branch line; and 10) Riverside to LAUPT on the Union Pacific Railroad right-of-way. The project also includes a central maintenance facility at the Southern Pacific Taylor Yard north of downtown Los Angeles, and layover facilities in the Cities of Moorpark, Santa Clarita and San Bernardino. The location of these facilities is also shown in Figure 1. The goal of the project is to simultaneously improve regional mobility and air quality by reducing automobile trips. The beneficiaries could include commuters who would use the rail service, persons travelling on streets and highways who would experience less traffic congestion and delay and persons residing in the South Coast Air Basin who would benefit from improved air quality.

Name of the Public Agency Approving Project: Southern California Regional Rail Authority (SCRRA)

Name of Person or Agency Carrying out the Project: SCRRA

Exempt Status (Check One):
___ Ministerial (14 Cal. Admin. Code S15268)
___ Declared Emergency (14 Cal. Admin. Code S15269[a])
___ Emergency Project (14 Cal. Admin. Code S15269[b])
X Statutory Exemption (14 Cal. Admin. Code SS15260 et. seq.)

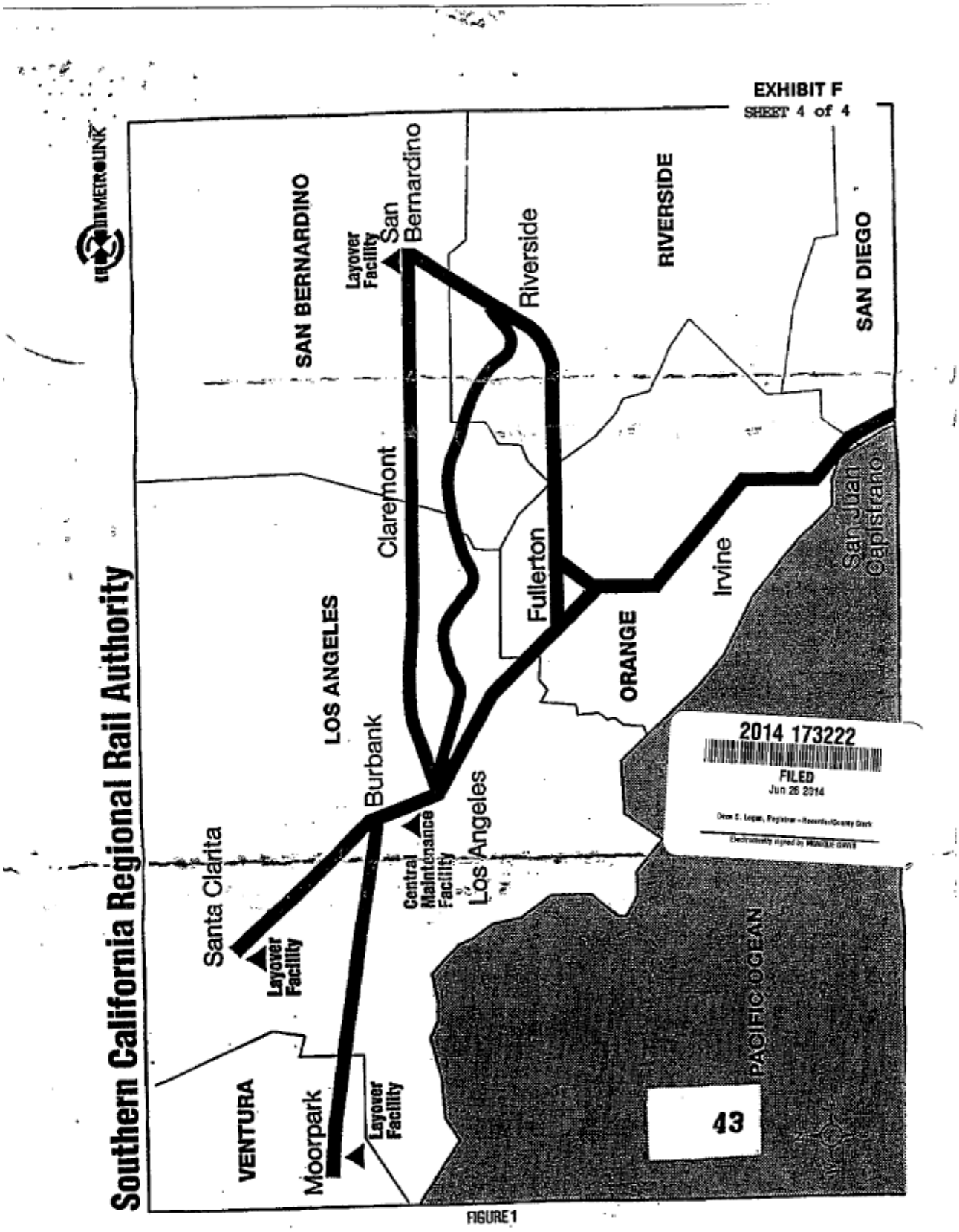


EXHIBIT F
SHEET 4 of 4
Southern California Regional Rail Authority
SAN BERNARDINO
LOS ANGELES
ORANGE
RIVERSIDE
SAN DIEGO
VENTURA
San Bernardino
Layover Facility
Riverside
Claremont
Fullerton
Irvine
San Juan Capistrano
Burbank
Los Angeles
Central Maintenance Facility
Santa Clarita
Layover Facility
Moorpark
Layover Facility
PACIFIC OCEAN
43
2014 173222
FILED
Jun 26 2014

FIGURE 1

This is a true and certified copy of the record if it bears the seal, imprinted in purple ink, of the Registrar-Recorder/County Clerk

AUG 27 2014

REGISTRAR-RECORDER/COUNTY CLERK
LOS ANGELES COUNTY, CALIFORNIA

METROLINK

Southern California Regional Rail Authc

REQUEST FOR CERTIFICED COPY OF AMENDMENT TO EXISTING NOTICE OF EXEMPTION

To: County Clerk
County of Los Angeles
12400 Imperial Highway
Room #1201
Norwalk, CA 90650

Subject: Request for Document # 2014173222 – Filing of Amendment to Existing Notice of Exemption for Southern California Regional Rail Authority (SCRRA) Commuter Rail System

Project Location: Counties of Los Angeles/San Bernardino/Orange/Ventura/Riverside/San Diego

Attached: Payment of $2

SEND COPY TO ADDRESSEE BELOW:

Patricia Watkins
Assistant Director, Public Projects
279 E. Arrow Highway, Suite 101
San Dimas, CA 91773

One Gateway Plaza, Floor 12 Los Angeles, CA 90012 T (213) 452.0200

metrolinktrains.com

700 S