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Cheatham County
Transport Study to Support Delivery of Power Equipment

Barnhart Route Study
Prepared for:

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TENNESSEE VALLEY AUTHORITY

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Route Study Contents

1. PURPOSE OF ROUTE STUDY

1.1 To identify potential rail car off-loading locations to receive the power equipment free on-board delivering rail cars as near the Cheatham County site as possible.
1.2 To identify any civil improvements required to discharge the cargo from rail car.
1.3 Provide hauling diagrams showing the required turning radius, width & height requirements, and ground bearing loadings for transportation of the power equipment from the rail car discharge location to the Cheatham County site.
1.4 Identify any obstacles on the proposed haul routes from the rail car offloading locations to the Cheatham County site.
1.5 To determine what governing authorities will be required from governing entities for the transportation of the equipment from the rail car discharge locations to the Cheatham County site.

2. RAIL CAR DELIVERY LOCATIONS

Barnhart identified Ashland City TN as the closest rail served city to the Cheatham County site. Ashland City is served by a short line railroad owned by the RJ Corman Railroad Group. Barnhart discussed the project with Grant Chaney, Director of Commercial Development for RJ Corman.

Mr. Chaney indicated his primary concern is the weight of the power equipment as the railroad has several old wood truss bridges between Nashville and Ashland City. Mr. Chaney suggested having a rail clearance submitted ASAP this will allow their engineers the opportunity to review the weights crossing these bridges and look at the clearances.

Barnhart identified 3 industries that are currently shipping or receiving products by rail car in Ashland City and meet with each facilities operations manager.

- Arcosa Marine
- Gate Precast
- Strategic Materials

Arcosa Marine and Gate Precast facility rail spurs were deemed NOT VIABLE. These facilities spurs were short and designed to accommodate their operations and do not have room for gantry erection or transporter egress. Any improvements that would allow rail car off loading of the power equipment would be extremely costly and would impede the facilities day to day operations.

The Strategic Materials facility is a viable option. Barnhart met with David Sharp, Assist. Plant Manager and discussed the equipment's discharge. David indicated the plant typically gets two rail cars shifted in once a week, pulling two empty cars out and pushing two full cars in. These switches generally happen on Tuesday or Thursday. David indicated that if the deliveries could be coordinated as not to interfere with his operations, the plant will consider allowing the cars to off load in the plant.

The yellow area below is the area where we would off load if unloading inside the plant. While discharge in the yellow area is feasible, the area is congested and would be a hindrance to the plant.

In discussions with RJ Corman “Grant Chaney” we believe a better solution is to use either the lead in track to Strategic Materials or the end of the main line just beyond the lead in track. (See below)

The dead end of the main line shown below.

Offloading at the dead end of the main line will require some civil improvement for Gantry erection. Installing compacted fill on both the north and south sides of the track.

WE believe this to be the best option as equipment deliveries would not interfere with the Tuesday and Thursday switches into Strategic Materials. Also there appears to be room to push empty cars forward allowing multiple rail cars delivering at a time.

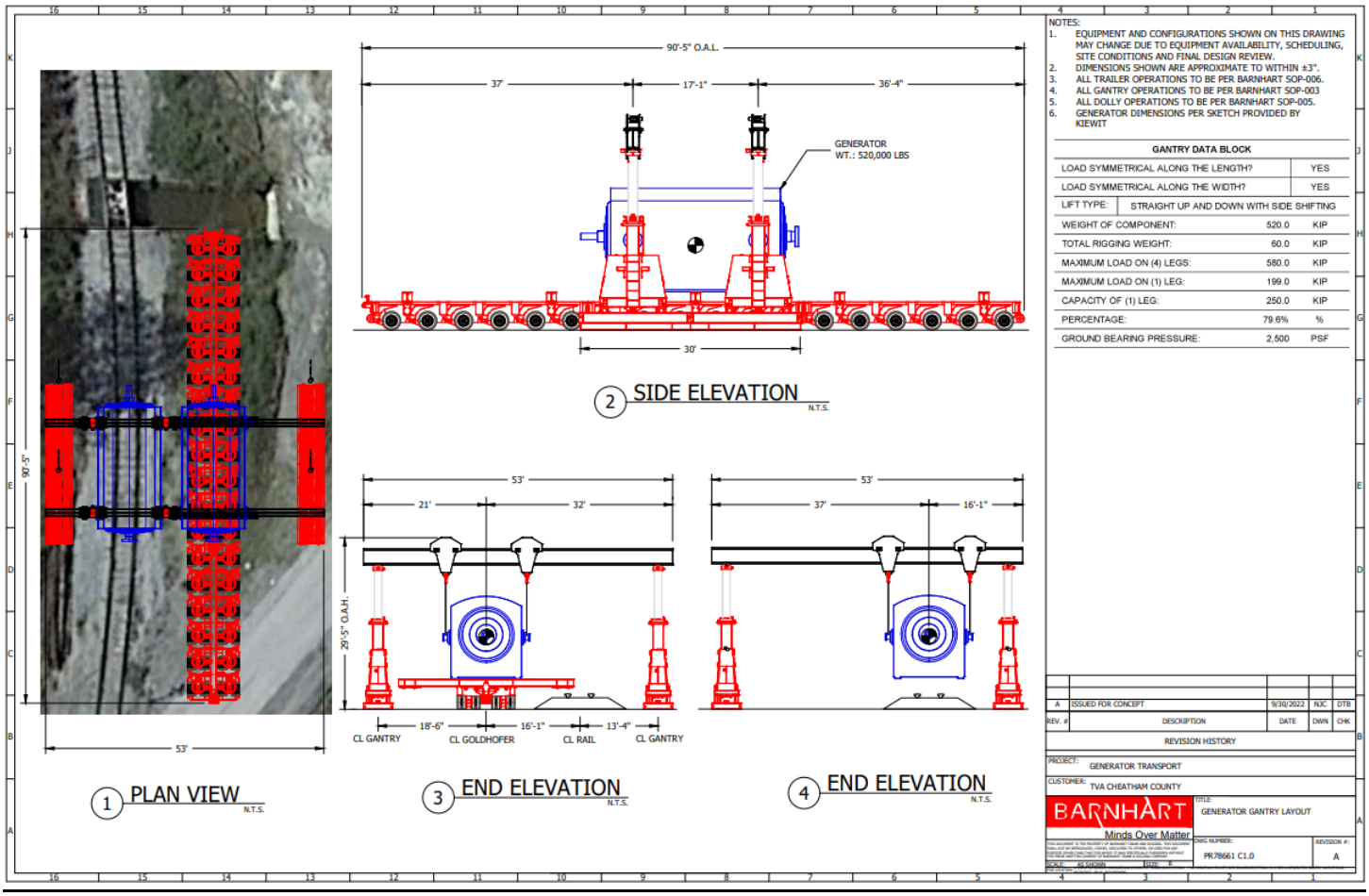
Lead in track to Strategic Materials shown below.

The Strategic Materials lead in track will not require as significant an improvement, only matting.
As previously stated, deliveries would have to be coordinated as not to interfere with Strategic Materials operations.

3. RAILCAR DISCHARGE DSCHARGE DRAWING

The gantry shown below is a “Side Shift Set Up” the lift system is superimposed over the Strategic Metals lead in track. The dimensional requirements will be the same regardless of what location is chosen.

This gantry set up represents worst case scenario and a smaller gantry set up may prove viable after the transporter configuration is identified and approved by the TNDOT.



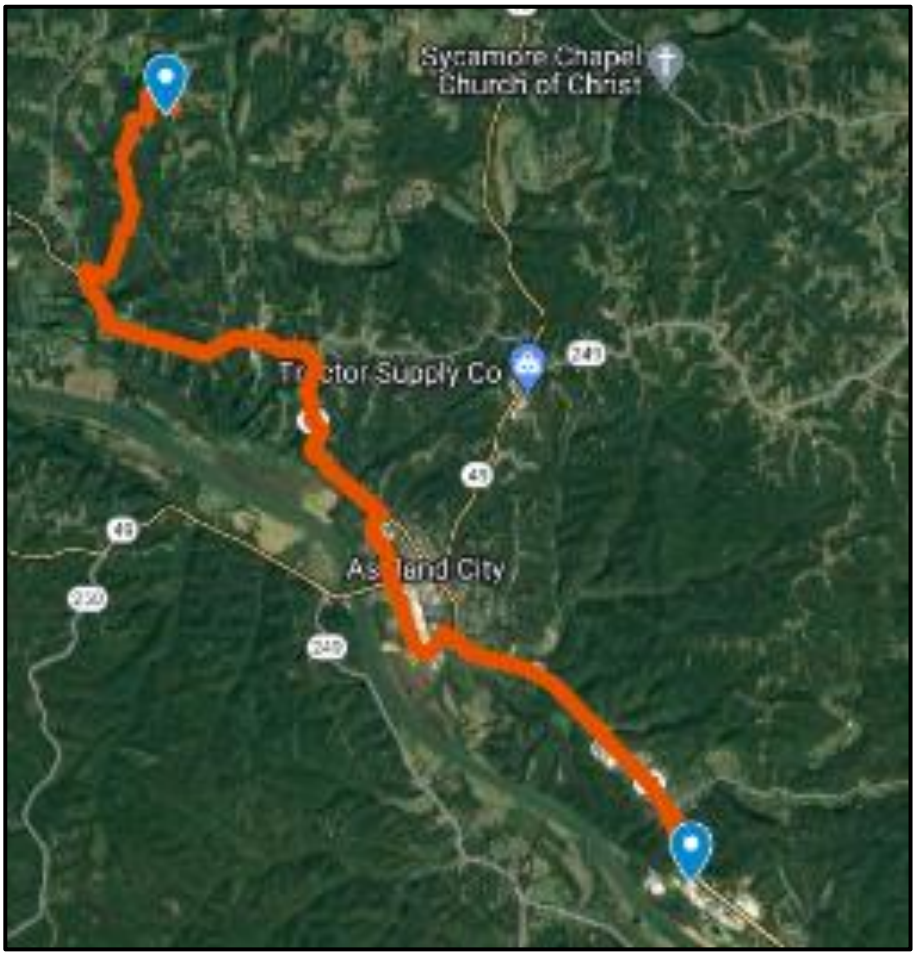
4. HAUL ROUTES

The haul route shown to the right is the shortest potential route.

The route starts at the end of RJ Corman main line at Thompson RD in Ashland City

Thompson RD to Hwy 12
Hwy 12 north to SR455 (Tenn. Waltz PKW)
SR445 around Ashland city back to Hwy12
Hwy 12 to Macon Wall RD
Macon Wall RD north to Lockersville RD
Lockersville south to site entrance.

The above route is approximately 11 miles



This route will be governed by:

- The City of Ashland City
  - Thompson RD
- TNDOT
  - Hwy12
  - SR455
- Cheatham County
  - Macon Wall
  - Lockersville RD

As with all heavy transport projects bridges are the governing authority's primary concern.
In Tennessee there is also 40,000lbs per line axle rule for pavement.

There are no bridges on Thompson RD and only one box culvert on Macon wall that can be jumped if required.

On the Hwy 12 and SR 455 section our survey encountered the following bridge structures.

4.1 Bridges

Vietnam Veterans Bridge over Marrowbone Creek

180’ foot multiple span bridge

DRY CREEK BRIDGE

650’ foot multiple span bridge

MARKS CREEK BRIDGE

115’ foot bridge

SYACAMORE CREEK BRIDGE

350’ foot multiple span bridge

All bridges will require bridge analysis by TNDOT bridge engineers.
Dual lane transporter configurations will be required.

4.2 Macon Wall & Lockersville RD

Macon Hill Rd only has one small culvert, this structure may pass analysis due to the short span, plating the culvert may also be an option or the structure can be jumped using a ramping system.

The primary problem with both Macon Wall and Lockersville RD will be the road width (16’ feet) with no medium, and tight turns. Tree trimming will also be required in several locations. (see following pics)


YIELD


STOP

As the previous pictures show, there is no medium to these county roads. The minimum width for a dual lane transporter is 16 feet as you will see in the examples of Dual Lane Transporters in the next section of this survey.

This is critical, the Dual Lane Transporter that will be required to cross bridges may not be able to navigate the route on the Macon Wall and Lockersville portion of the haul route or the cost of making the haul route improvements will be cost prohibitive.

Our survey also shows that the required turn radius improvements will certainly encroach on private property and require approvals and agreements with private landowners.

Traffic control is also a factor as no other traffic will be able to travel the road when the load is on Macon Wall and Lockersville. A traffic control plan approved and assisted by State Troopers and County Sheriffs will be a requirement.

Another option to navigate Macon Wall and Lockersville Rd may be to trans-load the cargo from a Dual Lane Transporter to a 10' foot wide Self-Propelled transporter once on County Roads and off Hwy 12. This trans-load operation would require a significant amount of real-estate. Our current survey did not find a good location for a trans-load operation.

4.3 Alternate County Routes

Saddie Tree RD Route

This route also has a 16-foot-wide road base with no medium.

This route may have fewer turn radius issues, but several will be required.

As previously stated, the turn radius improvements will encroach on private property and will require approvals from Cheatham County and the landowners.

A detailed traffic control plan will be a requirement.

Extensive Tree trimming will also be required.

Lockersville RD Route

This route also has a 16-foot-wide road base with no medium.

This route is the most problematic due to two narrow old bridges. It is highly doubtful any transport configuration would pass engineering analysis.

This is also the route that would require the most turn improvements and tree trimming.

The route also has significant grade charges.

Based on our experience and the availability of other potential routes, I would deem this route as not viable or at a minimum cost prohibitive.

5. TRANSPORT DRAWINGS

TNDOT will require some configuration of a “Dual Lane Transporter” to cross the bridges on HWY 12. The exact configuration will not be known until TNDOT Bridge engineers evaluate each structure. Use of a Dual Lane Transporter is not a guarantee of a permit approval. Some bridges just do not have the capacity to hold these types of MEGA-LOADS.

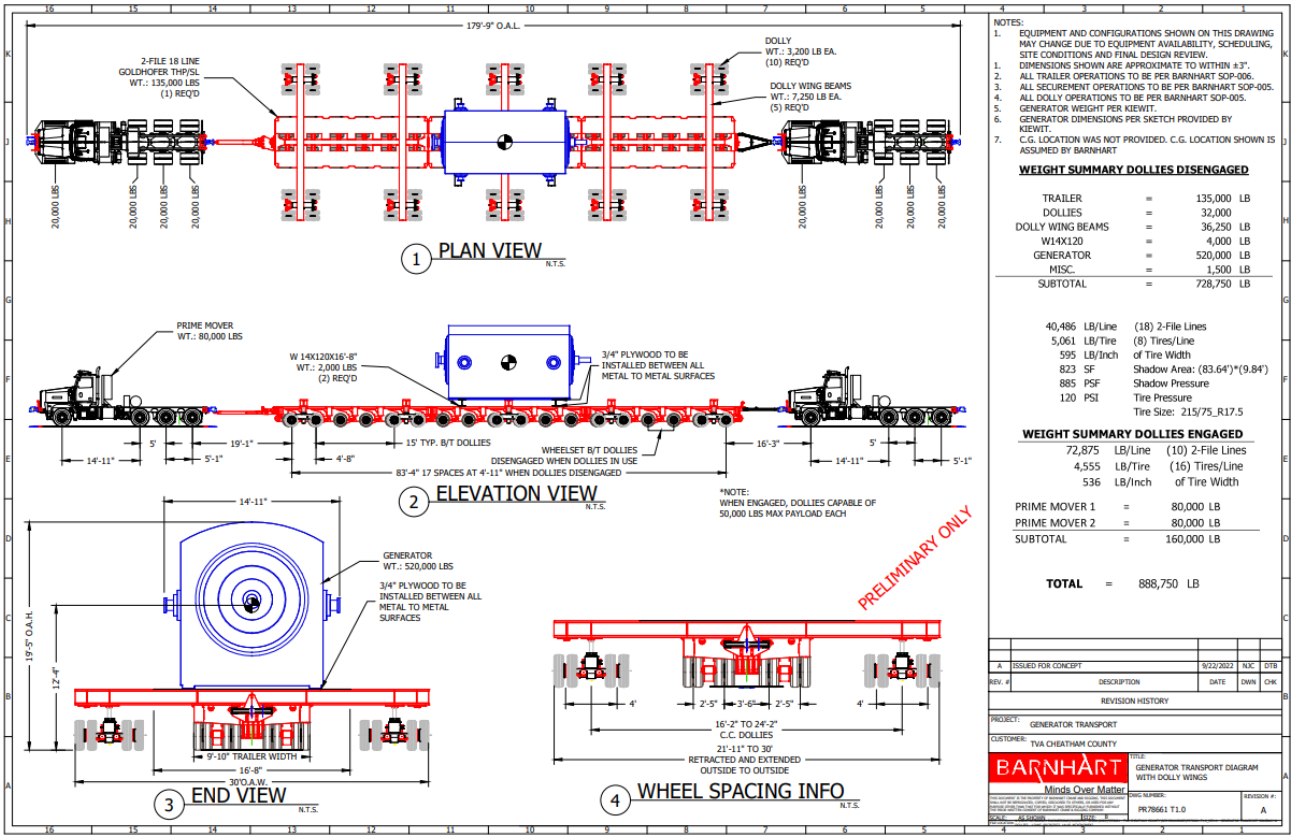
In some cases, bridge shoring must be installed, on shorter spans jumper ramps may be an option, in some cases using a suspension beam transporter and using various crab steer techniques are required to gain approvals.

TNDOT usually does their own bridge analysis, however on some past projects TNDOT has allowed Barnhart to bring in 3rd party bridge engineers specializing in Bridge analysis to prepare evaluations for TNDOT Bridge engineers review and approvals.

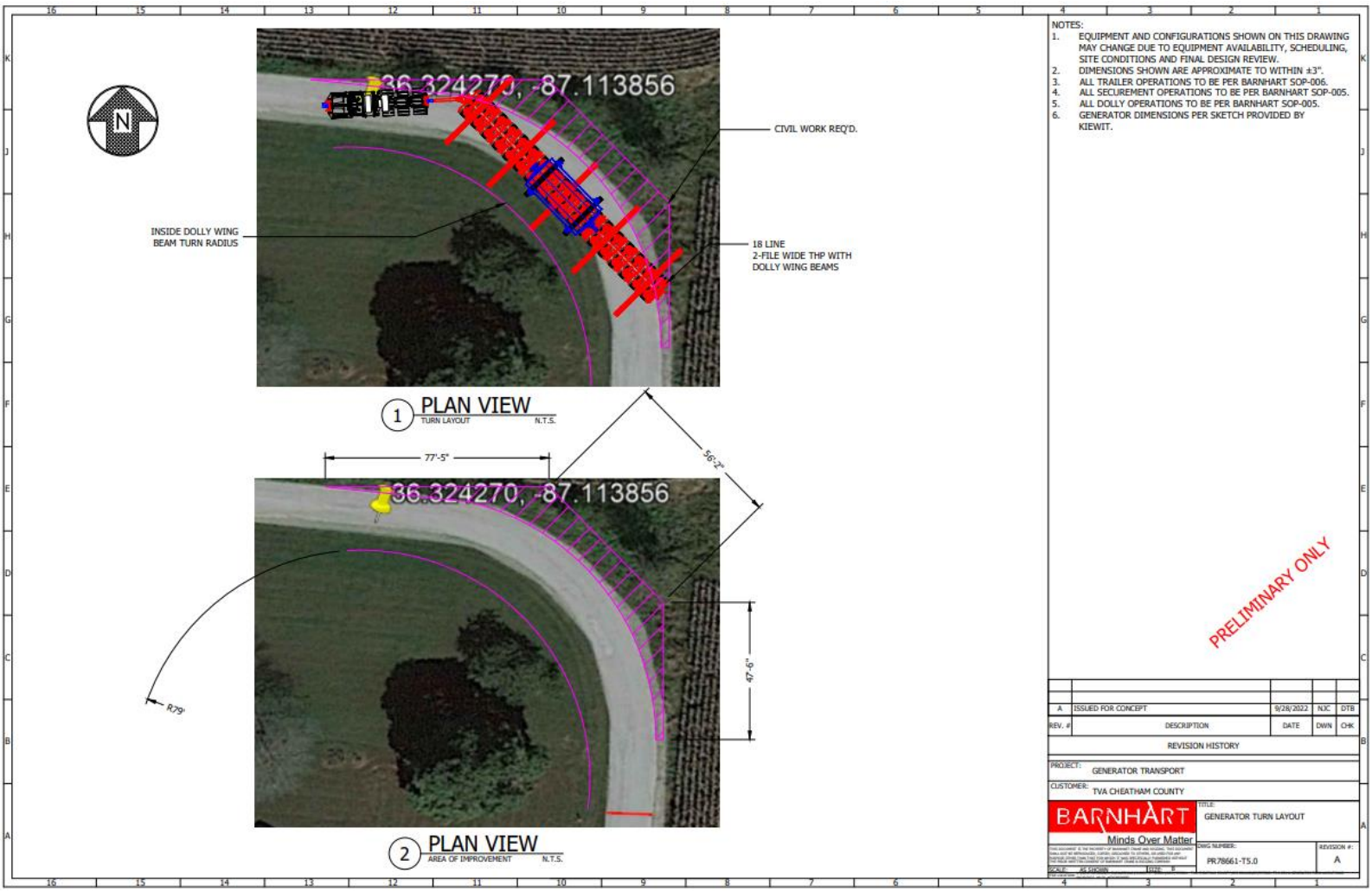
Barnhart cannot emphasize enough that bridges can be very problematic and finding solutions to these problems can take months working with Bridge engineers. The solutions can be very expensive to overcome. We highly recommend investing the resources to identify and resolve these issues far ahead of the project to mitigate cost escalations at time of execution.

The following are examples of Dual Lane Transporters used on past projects to get these MEGA-LOAS across bridges.

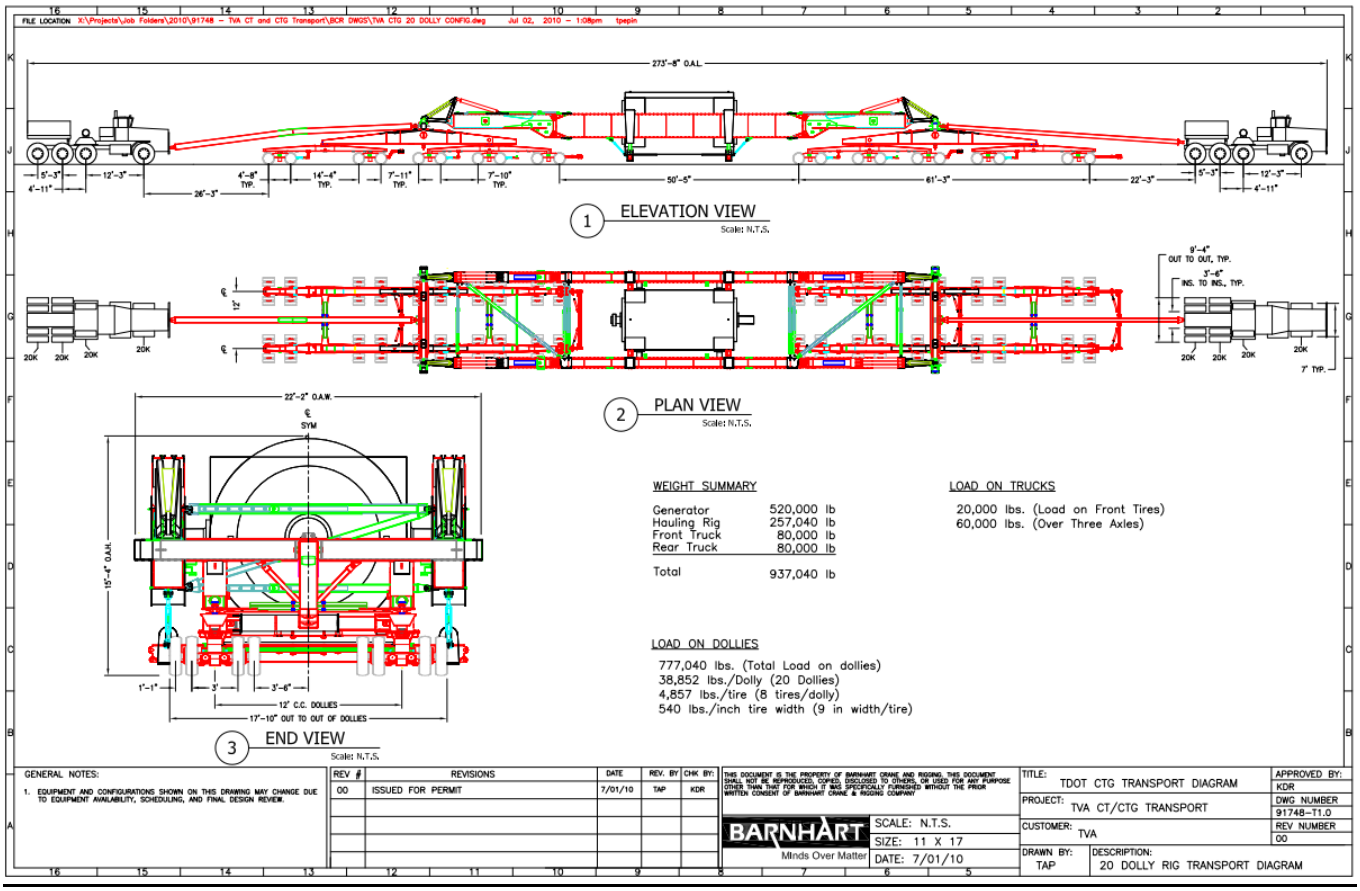
Example #1- 18-line axle THP with Dolly Wing Extensions



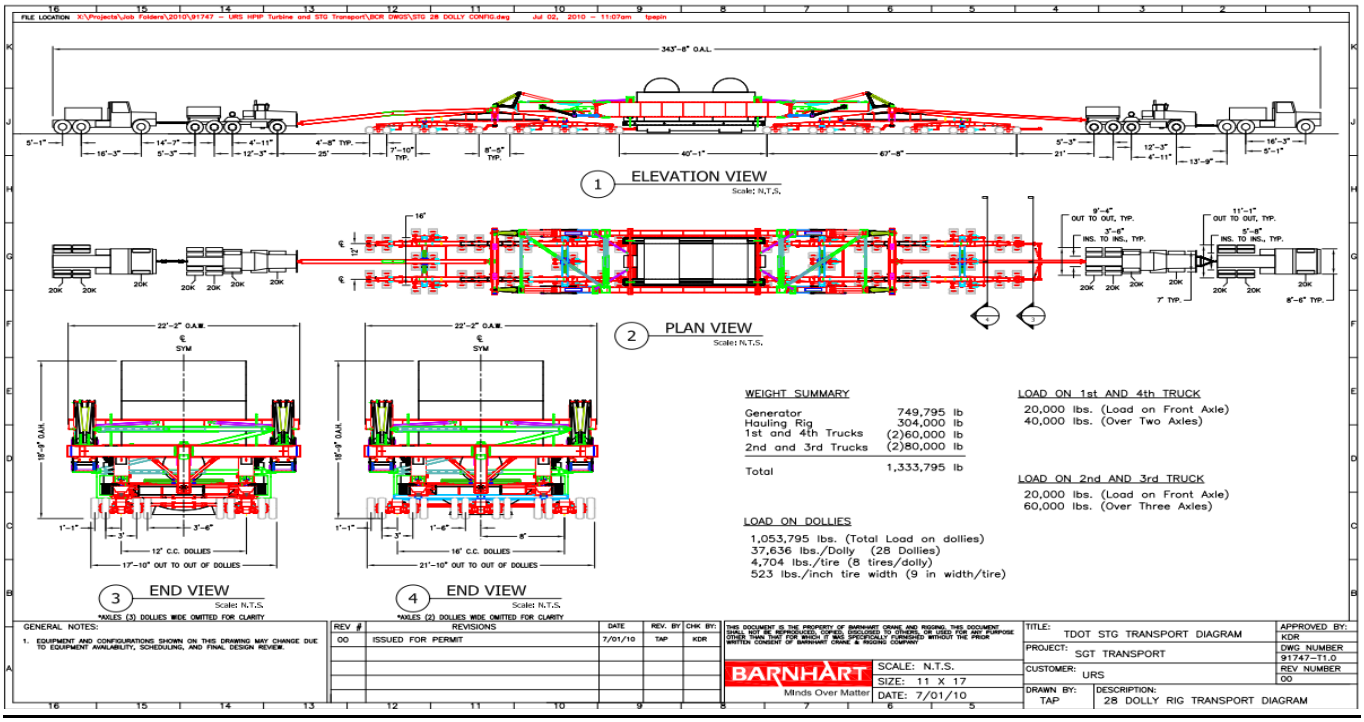
2nd Example Required Turn Radius



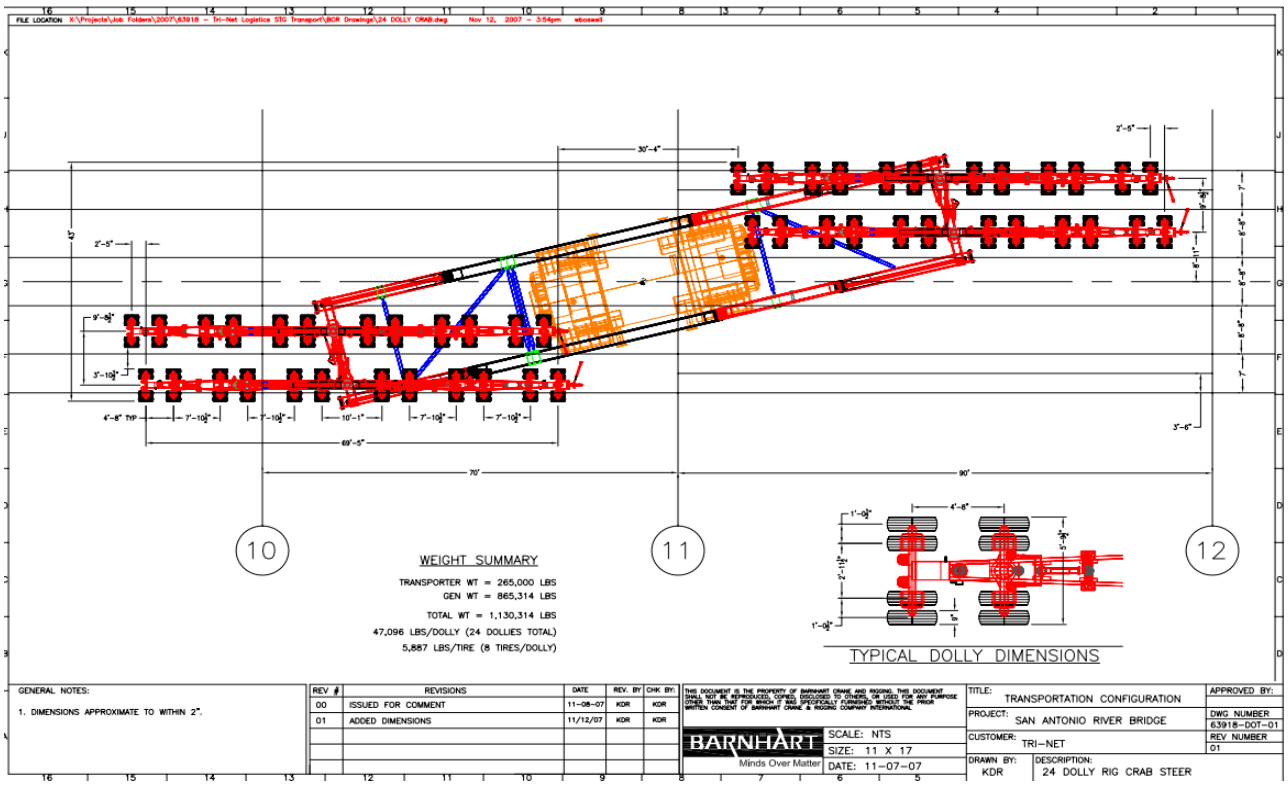
3rd Example 20-Dolly Suspension Beam Transporter

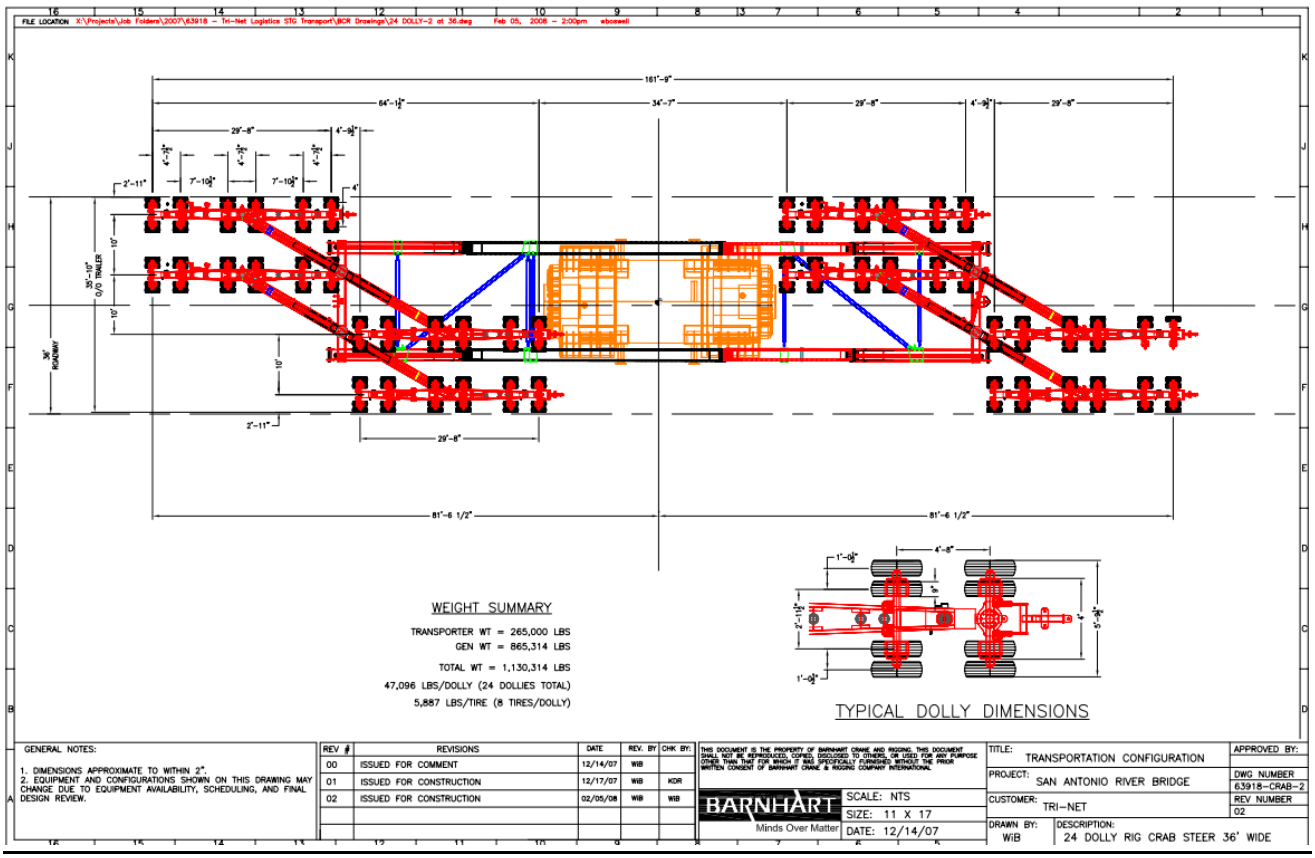


24-Dolly Suspension Bean Transporter



Example Crab Steering





6. Conclusion

Barnhart recommends off loading the power equipment at the dead end of the RJ Corman track in Ashland City TN. Off-loading at this location will not interfere with any service to other customers served by RJ Corman Railroad. Civil improvements for gantry erection and off loading will be minimal.

The primary concern with rail deliveries of the equipment will be the wood truss bridges on RJ Corman tracks between Nashville and Ashland City. Barnhart strongly suggest a clearance file be open as soon as possible to allow RJ Cormans engineers the opportunity to evaluate these bridge structures. This is a **CRITICAL HIGH-RISK ISSUE.**

Transporting from Ashland City to site will require some configuration of a "DUAL LANE TRANSPORTER" to cross bridges on Hwy 12. The exact transport configuration can not be determined without hauling application submittal to TNDOT and the others governing authorities.

On similar projects working with TNDOT it has taken 3 to 6 months in collaboration of independent bridge engineering firms to find a solution to crossing these bridges.

Overhead wires and signal arms will also have to be raised along the route, these improvements should be a minimal cost, requiring bucket truck assistance from the local utility, phone, and traffic signal owners.

Once off Hwy 12 Barnhart believes the "Saddie Tree Route" to be the most viable route due to this route having the fewest turn radius issues. Radius improvements will be required; however, the extent of these improvements can only be estimated once the transport configuration is identified.

The radius improvements will most likely encroach on private property requiring the cooperation and approvals of the landowners.

Tree trimming and line lifting will also be required on the county roads.

These secondary roads will be governed by Cheatham County.

As stated, transferring the power equipment to a SPMT or narrow gage transporter after leaving HW 12 may prove a viable and cost-effective solution. Barnhart did not identify an area to support this type transload operation while performing our survey.

We believe if the 18-line axle THP with Dolly wig extensions will pass Bridge analysis on Hwy 12, there may be an opportunity to remove the dollies and the extension beams after turning on Saddie Tree road. We believe this to be a BEST CASE SENERIO. As the road would be closed to traffic for the transport this would allow us time to remove the beams and dollies prior to traveling on Saddie Tree rd.

This would also eliminate having to off load the power equipment form the transporter and thus reduce risk.

RIGH RISK ISSUES:

- Wood Truss Bridges on RJ Corman RR
- Bridges on Hwy 12
- Narrow road width on secondary county roads
- Encroachment on private property.

We hope you have found this level 1 survey useful. We encourage TVA to open the rail clearance file as soon as possible.

We also stand ready to help TVA to work through the issues with TNDOT and Cheatham County. As stated, this will be a time-consuming process and require engineering support.

Thank you for allowing Barnhart to support TVA in this New Build Opportunity.

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