



**JGD Associates, Inc.**  
COMMERCIAL FACILITY DEVELOPMENT & CARE

# **NISTM**

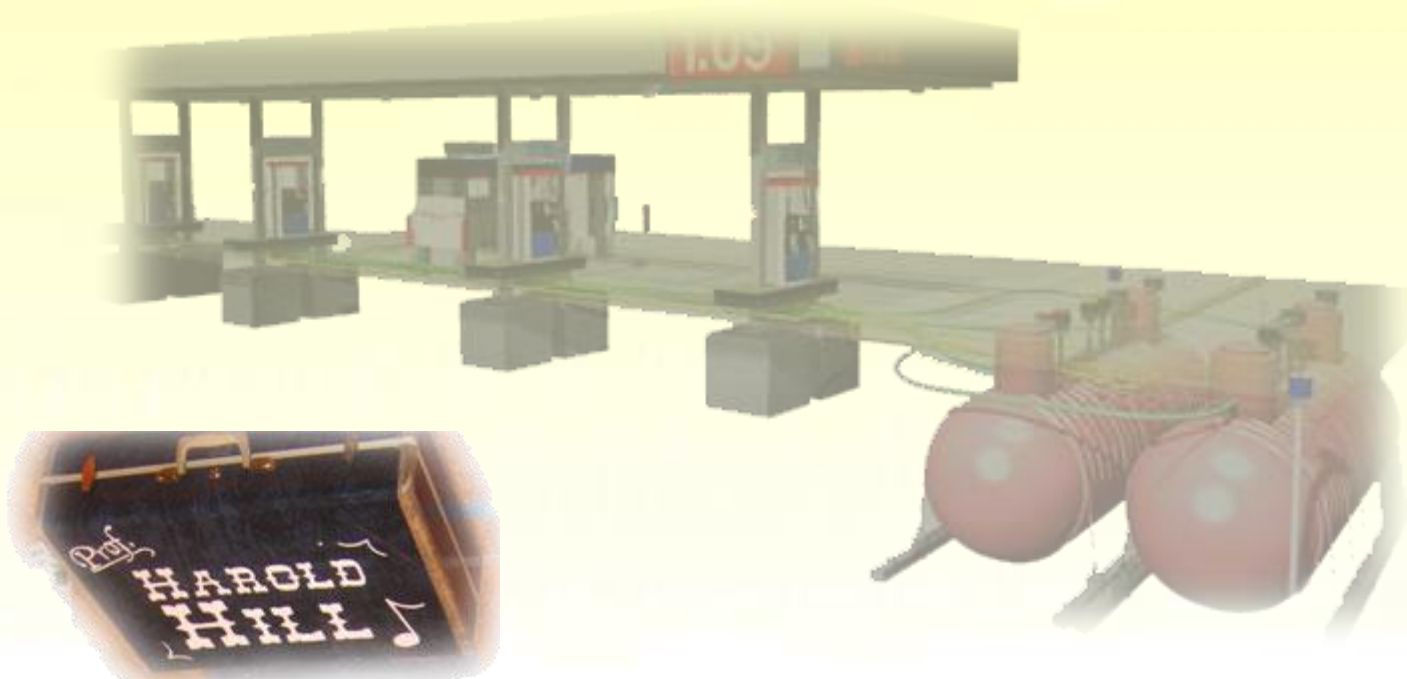
## **UST Site Planning Considerations**

**John G. Dzwonczyk, PE, CFPS**

**November 7, 2013**

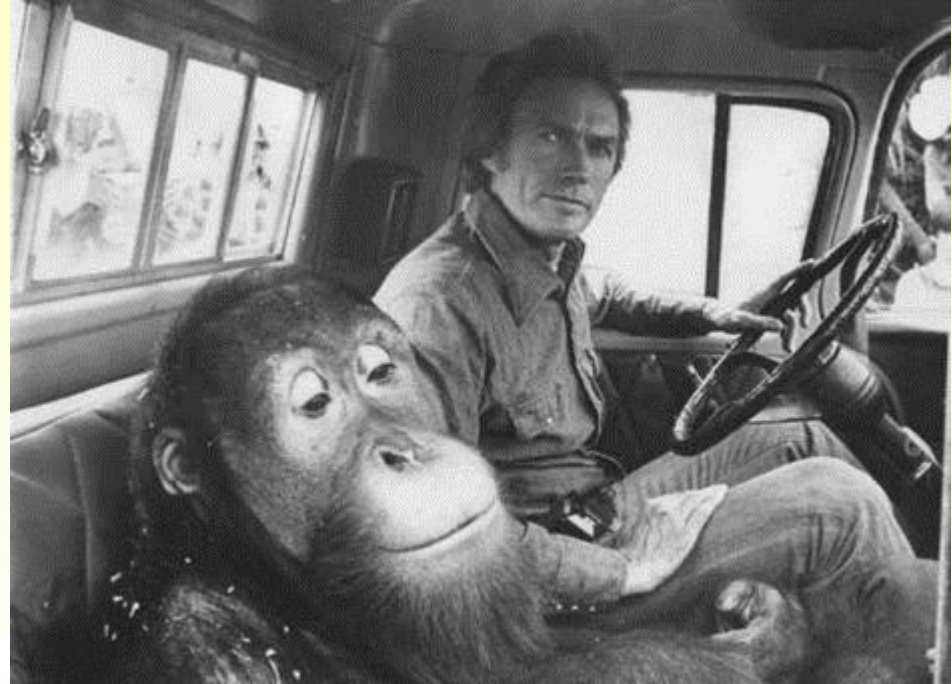
# Overview

- **A word about the role of engineers**
- **Site Planning**
- **Installation planning**



# About Planning and Tanks

- **Higher-order thinking**
- **Two heads are better than one**
- **Don't get painted into a corner**
- **The limits of Monkey-see, monkey do**

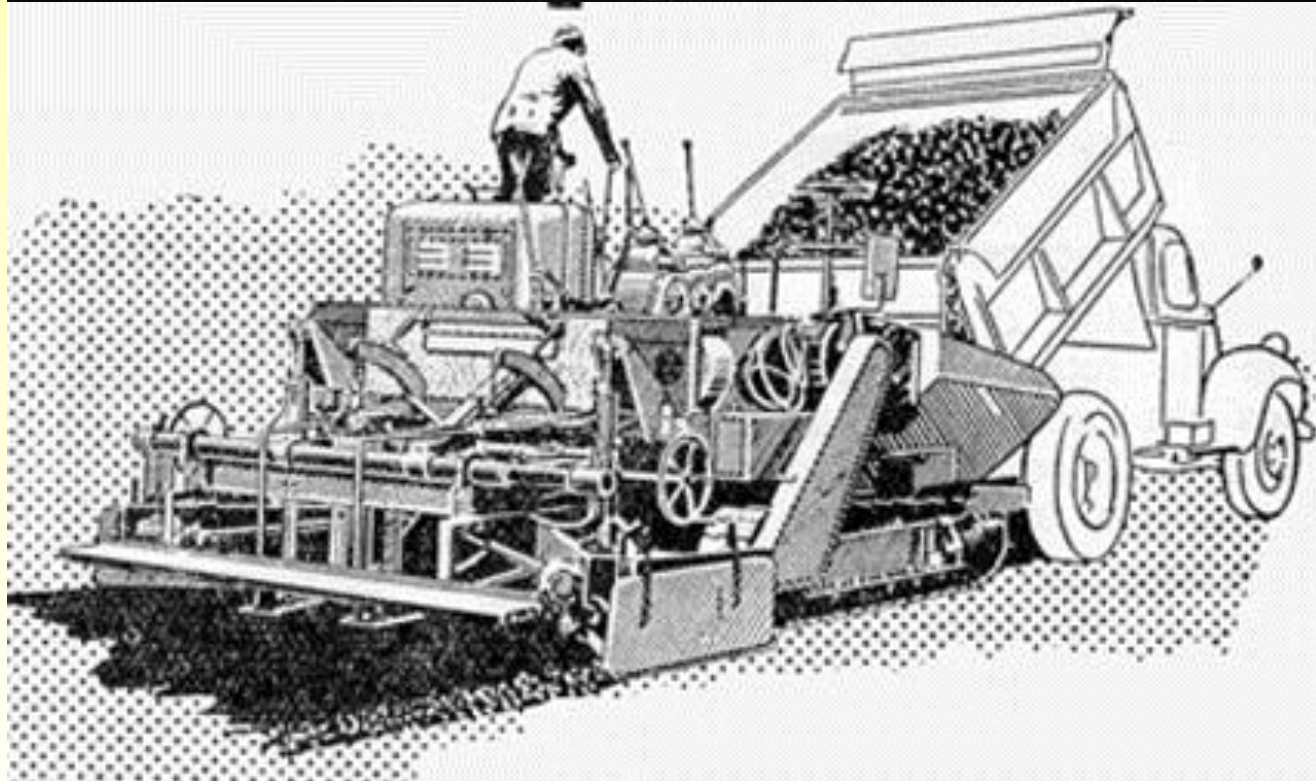


**Don't let this happen**



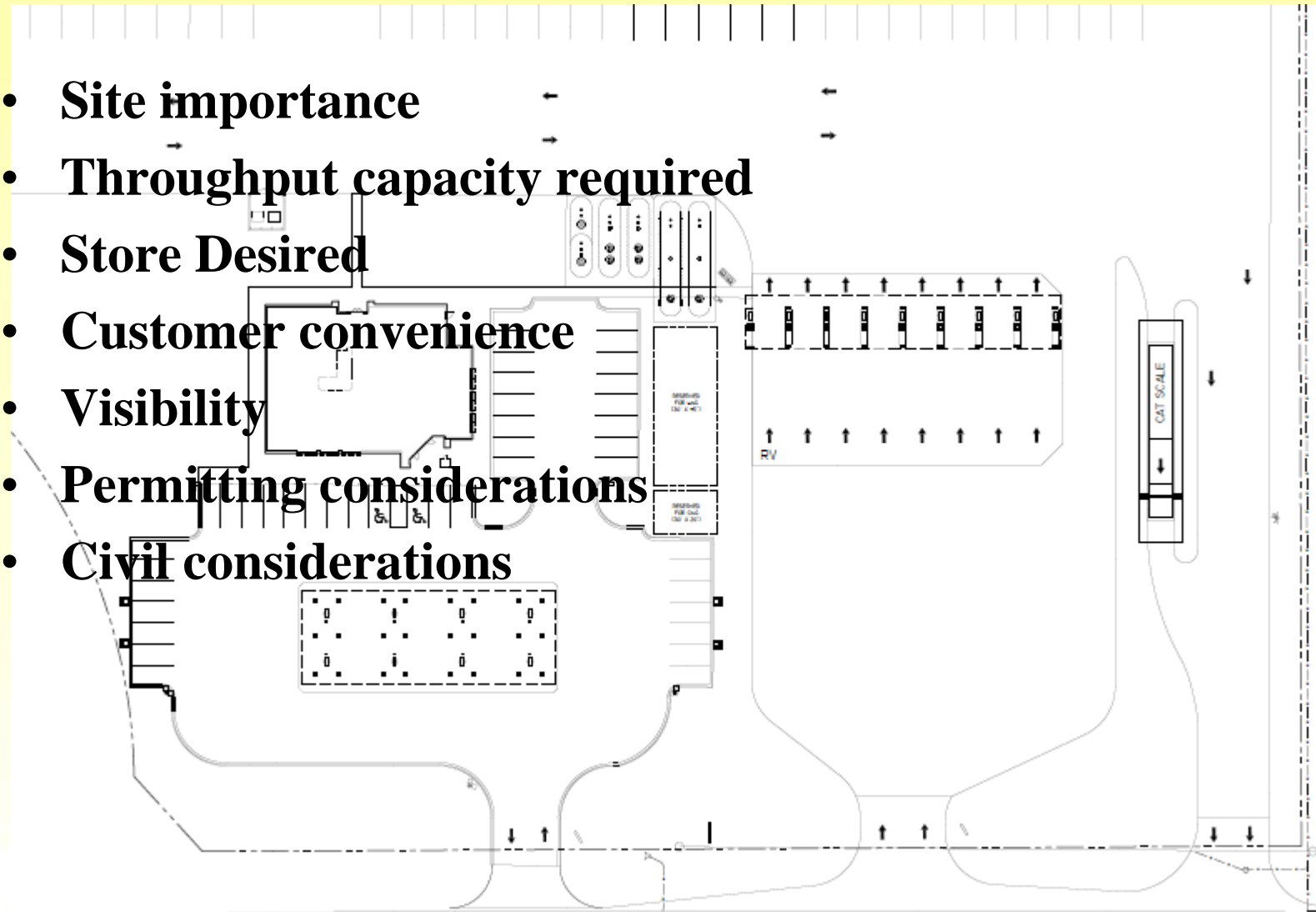
Where is Your project heading?

*Good Intentions*  
PAVING CO.



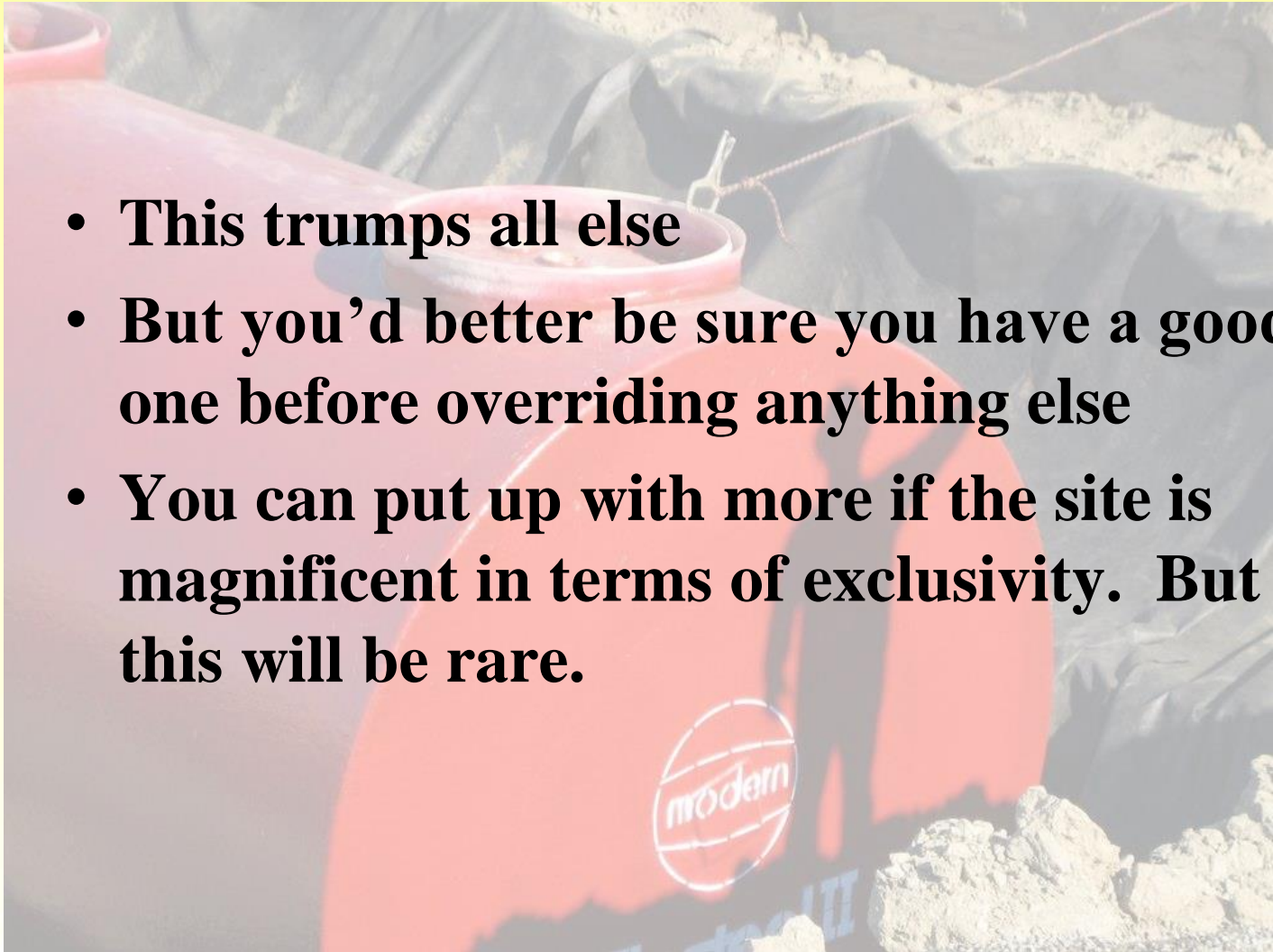
# Site Planning Hierarchy

- **Site importance**
- **Throughput capacity required**
- **Store Desired**
- **Customer convenience**
- **Visibility**
- **Permitting considerations**
- **Civil considerations**



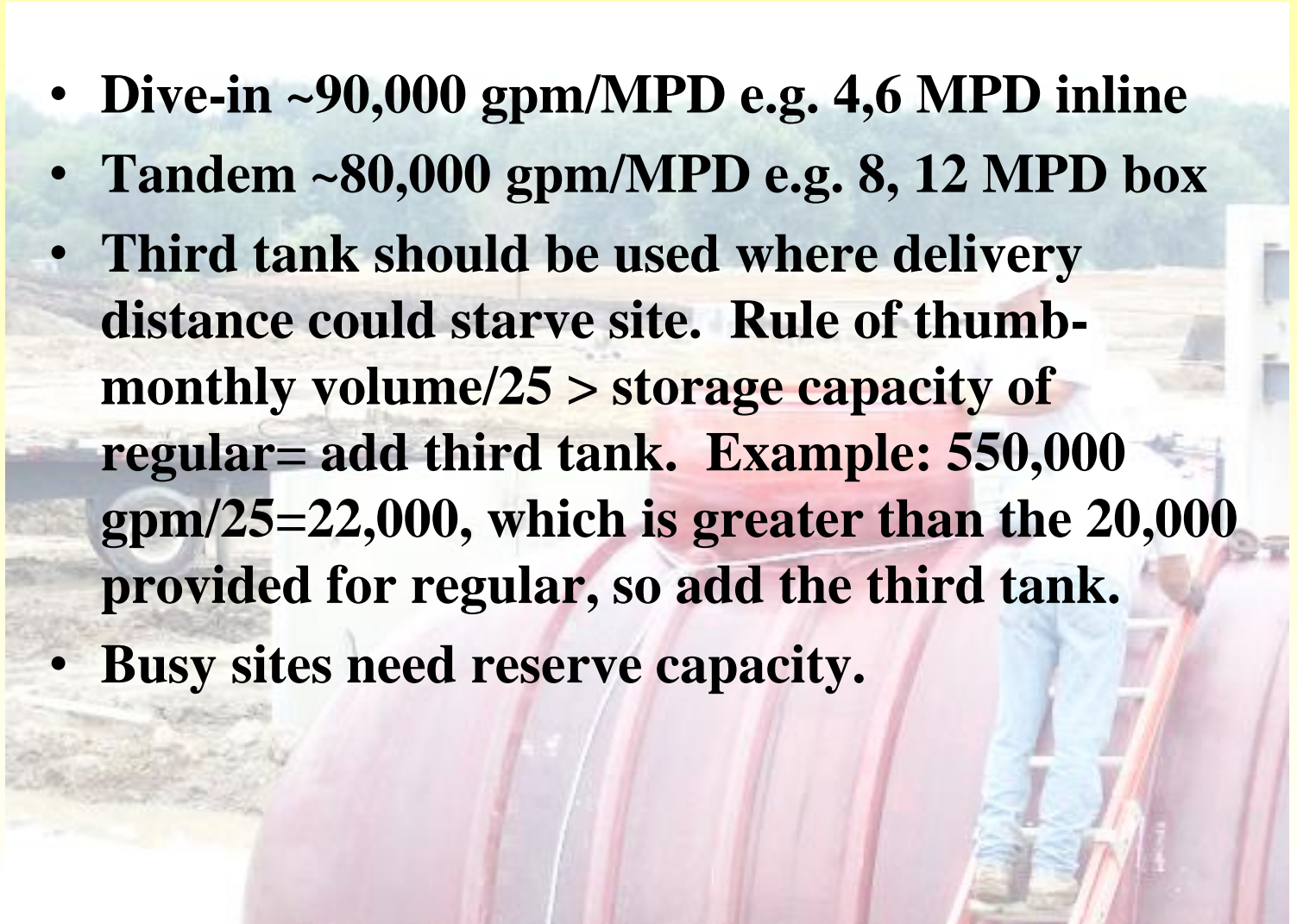
# Site importance

- **This trumps all else**
- **But you'd better be sure you have a good one before overriding anything else**
- **You can put up with more if the site is magnificent in terms of exclusivity. But this will be rare.**



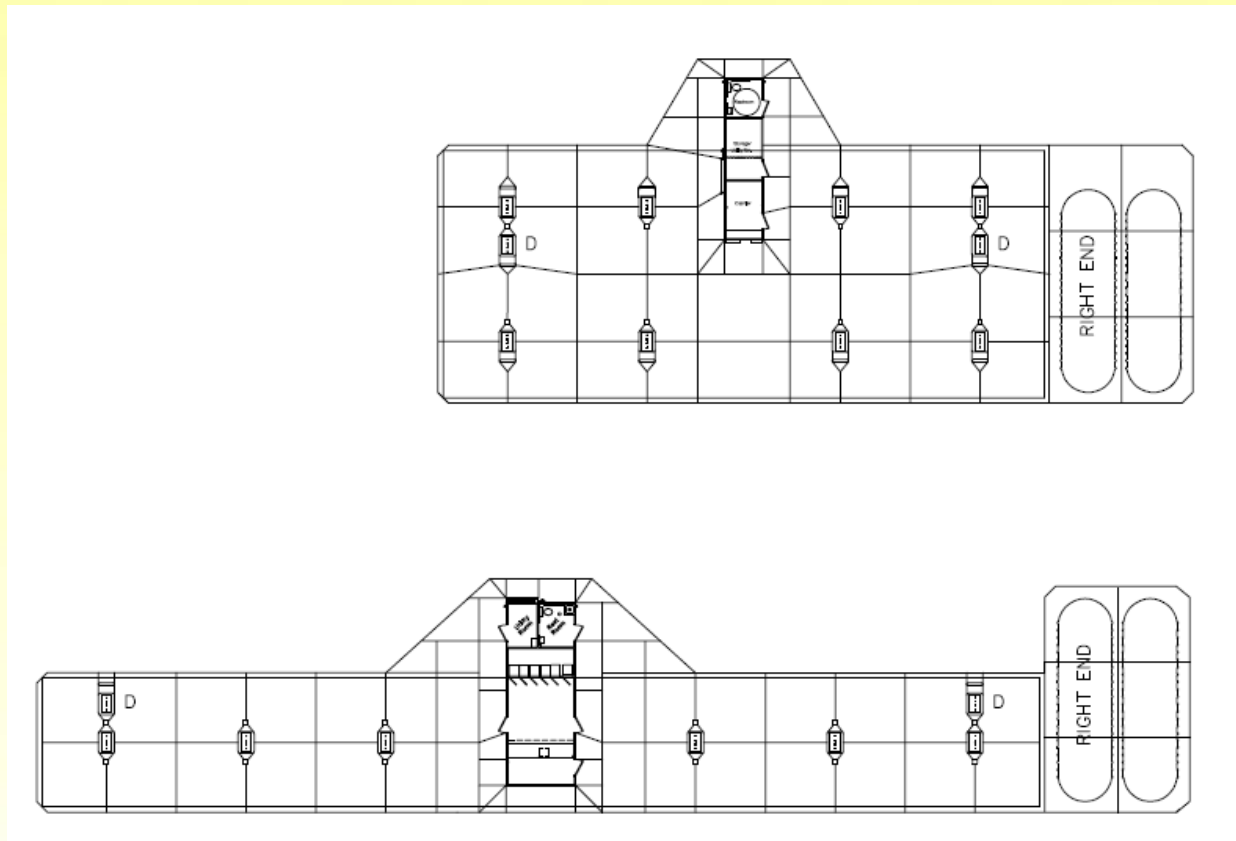
# Throughput capacity required

- **Dive-in ~90,000 gpm/MPD e.g. 4,6 MPD inline**
- **Tandem ~80,000 gpm/MPD e.g. 8, 12 MPD box**
- **Third tank should be used where delivery distance could starve site. Rule of thumb- monthly volume/25 > storage capacity of regular= add third tank. Example: 550,000 gpm/25=22,000, which is greater than the 20,000 provided for regular, so add the third tank.**
- **Busy sites need reserve capacity.**

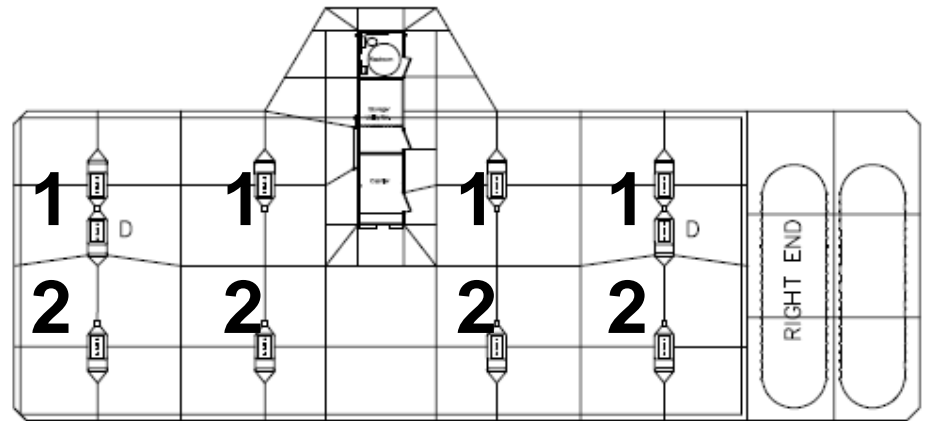




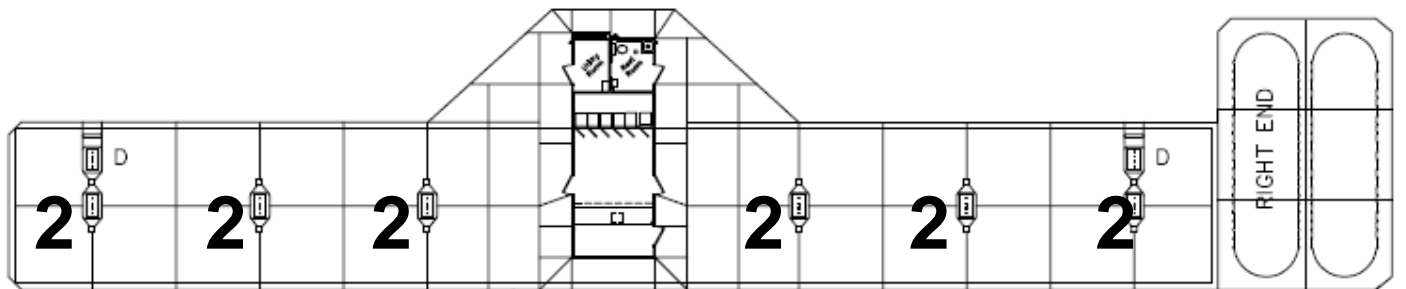
# Which one can pump more?



# Applying the Math



**total = 12**



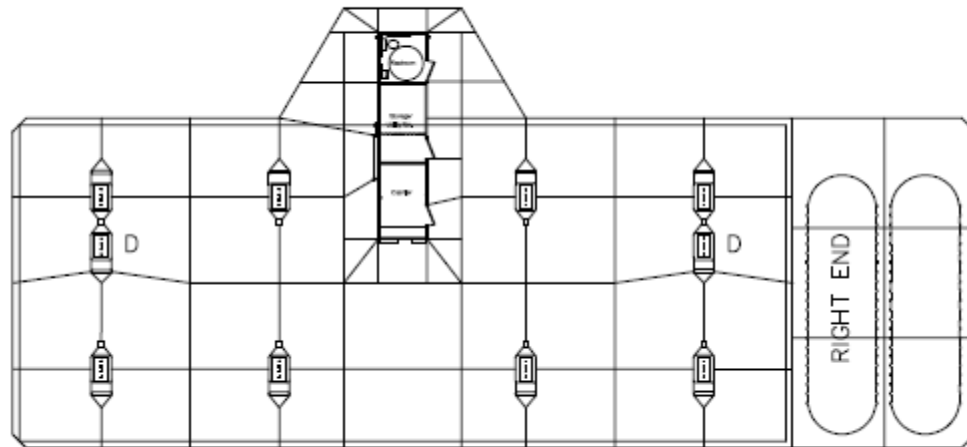
**total = 12**

# Pumping capacity?

At forced flow,

$8 \times 80,000 = 640,000$  gals/ month

$6 \times 90,000 = 540,000$  gals/ month



# Store Desired

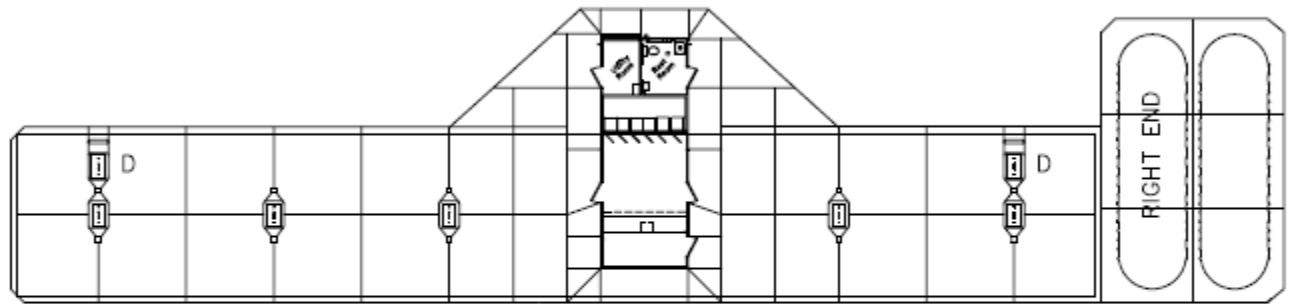


# Customer Convenience

- **Easy driveway access**
- **Front approach vastly preferred**
- **Must have at least two good points of access on all sites**
- **Face the way the cars are coming. If driveways are in the rear of the lot, face that way, or at least sideways**
- **If there are uneven numbers of fueling points divided by an island marketer, put the greater quantity on the side that will get the most traffic**
- **Avoid structures that damage cars in normal use**
- **Consider future expansion when locating tanks**

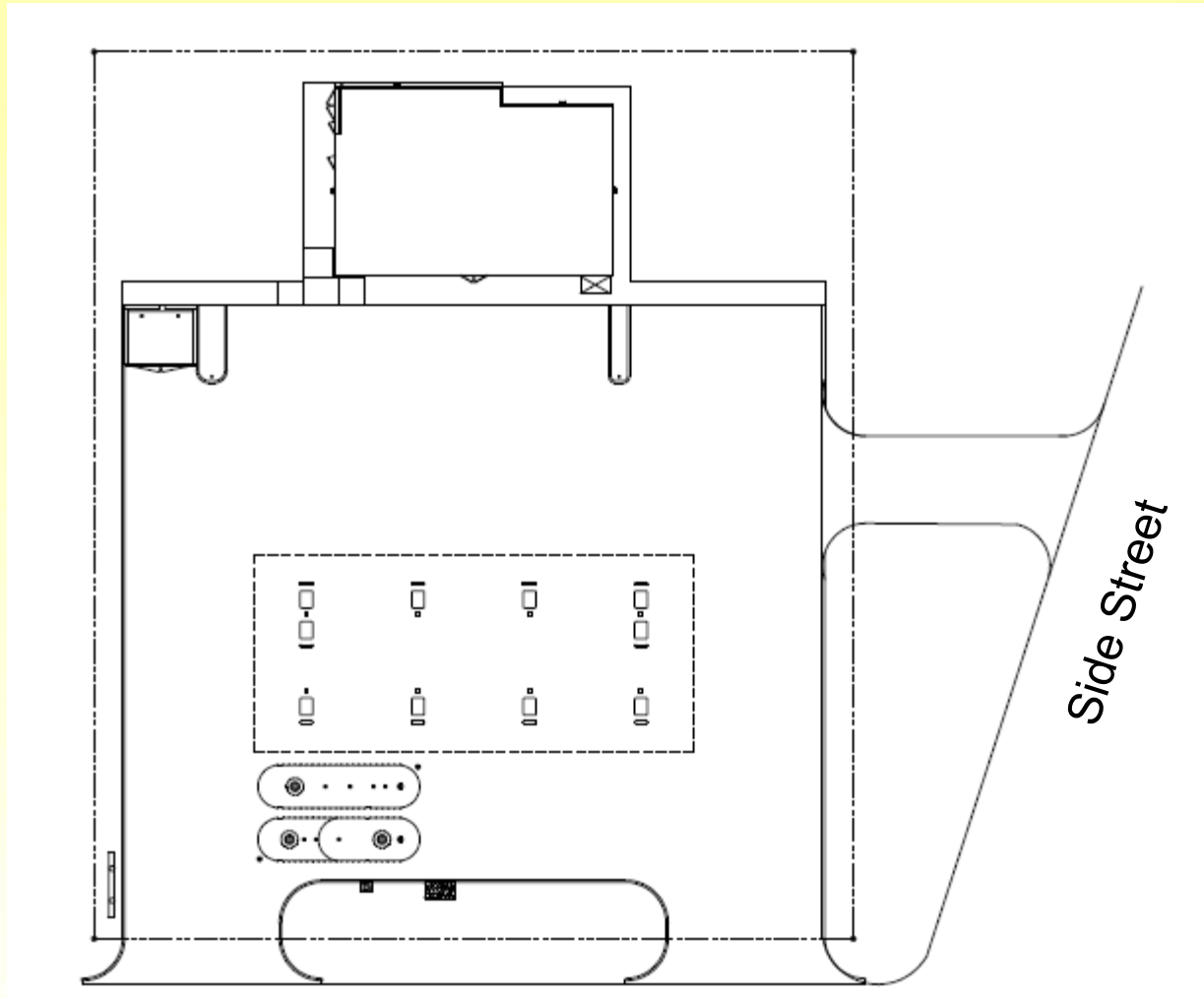
# Explanatory

Side Street



Main Street

# Explanatory



Main Street

# What is the customer seeing?





# The Driveway that Never Was



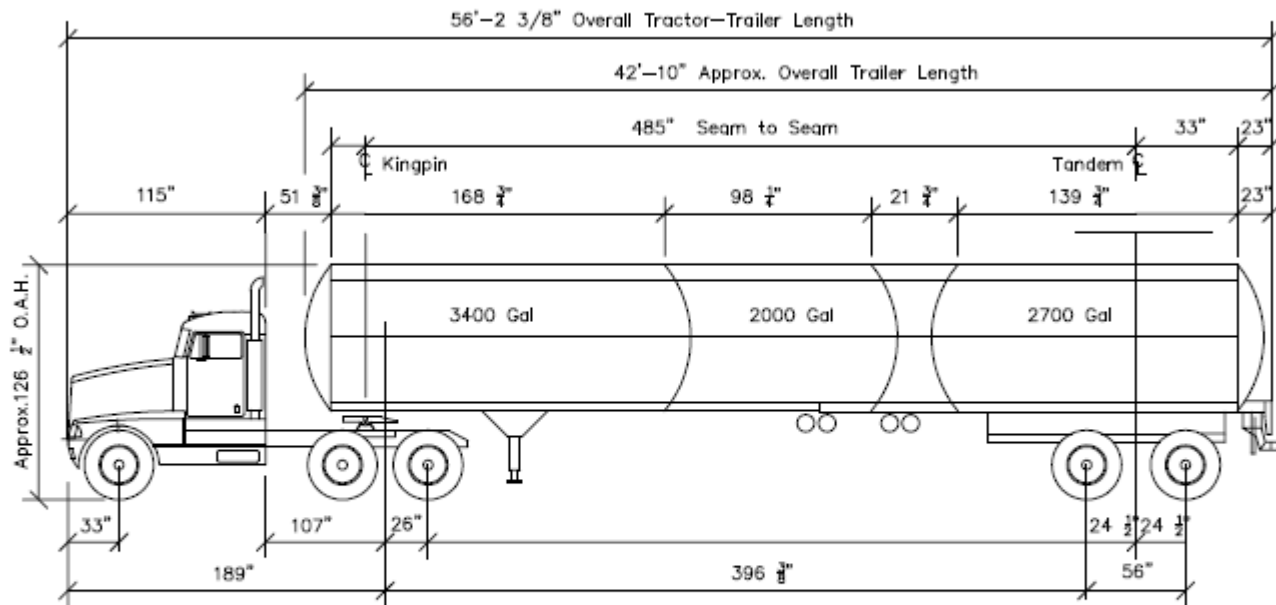
# Test Your Expertise



# Tanker Access

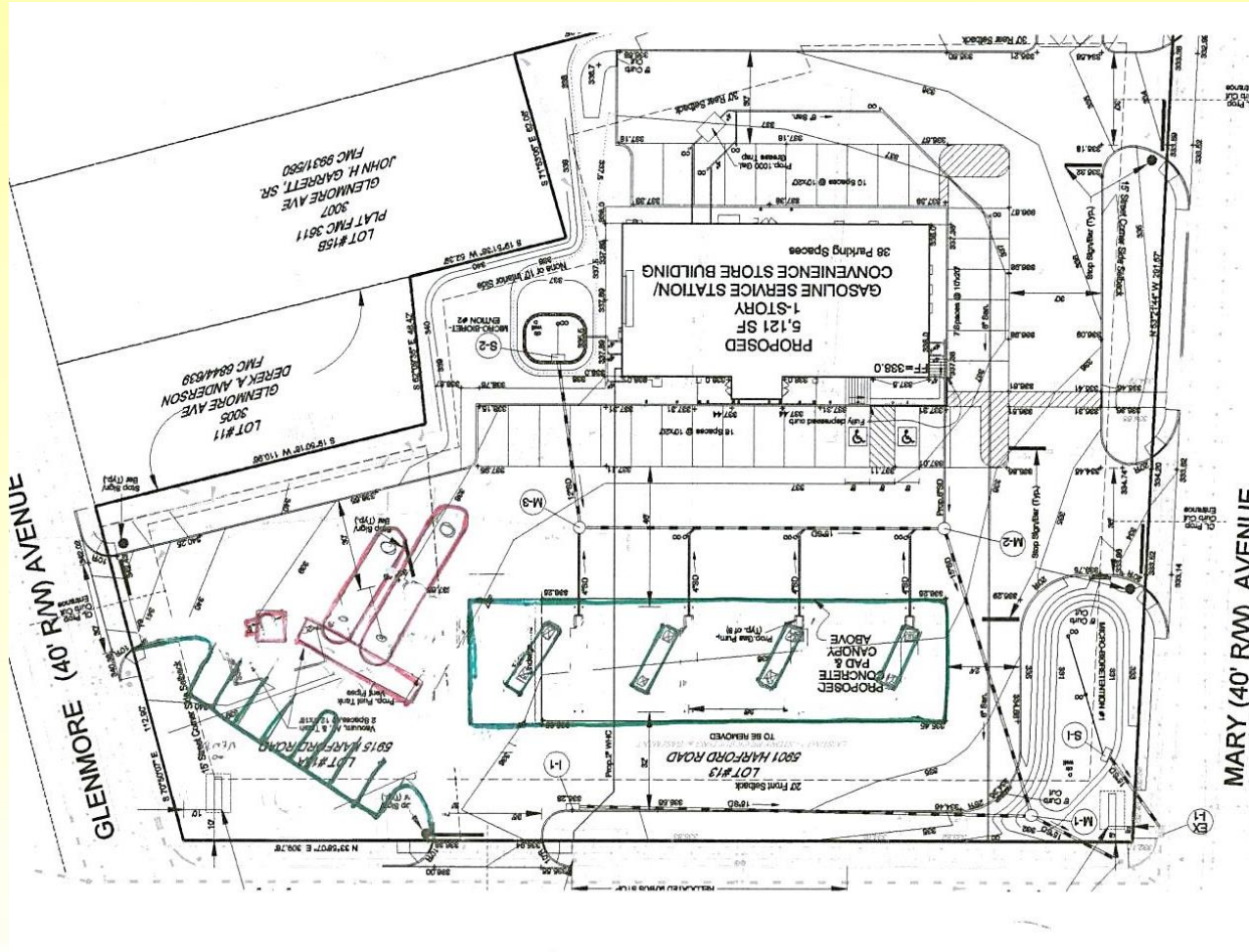
- **Tanker should not block fueling points**
- **Tanker should not block driveway**
- **Tanker should not have to back up**
- **Tanker should get to all fill points in one positioning**
- **Tank field should be rotated to line up maximum number of fills to right side of truck path.**

# Tanker Access

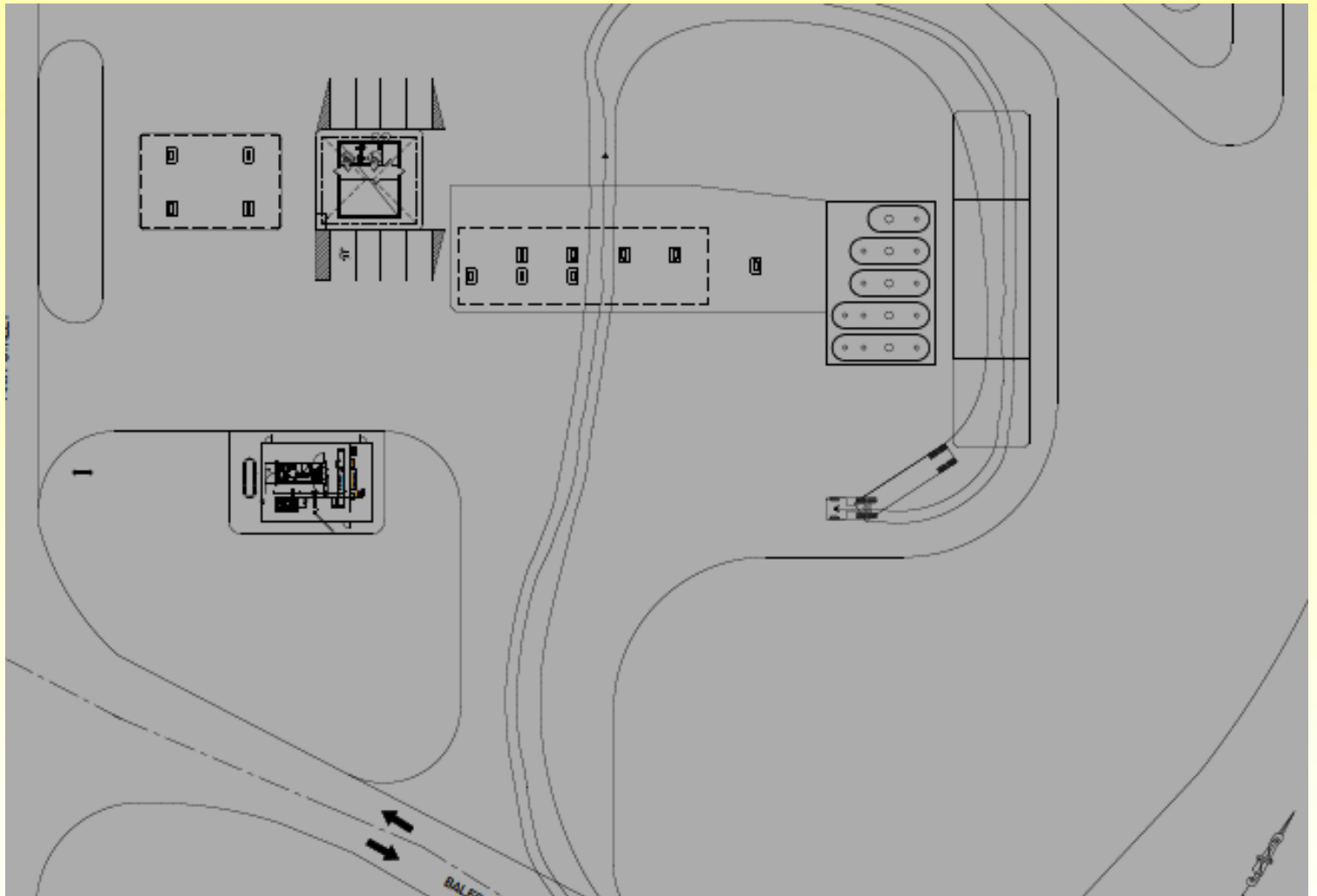


TANKER	Tractor Width : 8.00	Trailer Track : 8.50
	Trailer Width : 8.50	Steering Angle : 17.7
	Tractor Track : 8.00	Tractor/Trailer Angle: 70.00

# Tanker Access



# AutoTurn



# Dumpster location

- **Locate Dumpster at least 10' from any building overhang for fire code reasons**
- **Avoid having dumpster back up into main access points, cars standing at islands or delivery truck offloading points.**
- **Put enough of a heavy duty concrete apron in front of the dumpster to allow maneuvering without pavement damage.**

# Visibility

- **Customer must be able to see island availability**
- **Customer must be able to see store offer from islands**
- **See facility well from road**
  - **Customer must be able to see sign(s) well from primary approach directions.**
- **By code, cashier must be able to see all islands controlled**



# What is the customer seeing?





# Permitting Considerations

- **You should get variances, negotiate hard for anything higher in the priorities above. The argument for it is implicit in the hierarchy.**
- **You should argue cost, if permitting considerations affect civil in a negative way. Cost is a hardship**

# Customer Friendly

- **Avoid catch basins in driving lanes**
- **Space islands to allow vehicles to open doors on both sides without interference.**
- **Provide passing lanes in addition to parking lanes alongside islands, whenever possible.**
- **Locate islands where their use will not impede emergency access or egress for vehicles or pedestrians.**
- **Provide sufficient lighting for safe, accurate vehicle refueling.**
- **No water standing or flowing across island areas**
- **No pointy curbing arrangements**
- **No blind spots, especially for driveways**
  - **Include location of signs, traffic controllers, transformers, etc.**

# **Petroleum Friendly**

- **No ponding over tanks**
- **No site drainage across tanks**
- **No tanks uphill of islands**
- **No catch basins within 50' of tanks**
- **No more than 12" grade between any two points on tank pad**
- **No sources of ignition within 20' of tanks, dispensers**
- **Locate fills on tanks within 15 feet of planned delivery truck route to minimize the need for extension hoses in delivery.**
- **E-stops within 100' of all dispensers**

# Operations Friendly

- **Consideration of delivery truck parking**
- **Consideration of stacking queue not blocking access**
- **Not too much landscaping to maintain**
  - **Lawn mowing is easier than maintenance of shrub beds, etc.**
- **Avoid any assets, including dumpster, driveways, conveniences, out of the view of cashiers**
- **Put handicap parking in front of door to help keep this area clear**
- **Locate and configure handicap ramps to avoid conflict with other pedestrian traffic.**
  - **E.g. future pass-thru?**

# Grading

- **Use curb inlets wherever possible**
- **No 'breakover' grades in excess of 6%**
- **No yard grades >10%**
- **Exactly 6" island reveal at center of island**
- **Maximum 12" grade between any two points in fueling pad**
- **No water flow along or towards building**
- **Building FFE higher than pad on all sides**
- **No more than 8% grade from pad to door (1/12)**
- **No curb taller than 6" reveal**

# Preferred Curbing/ Drainage Detail

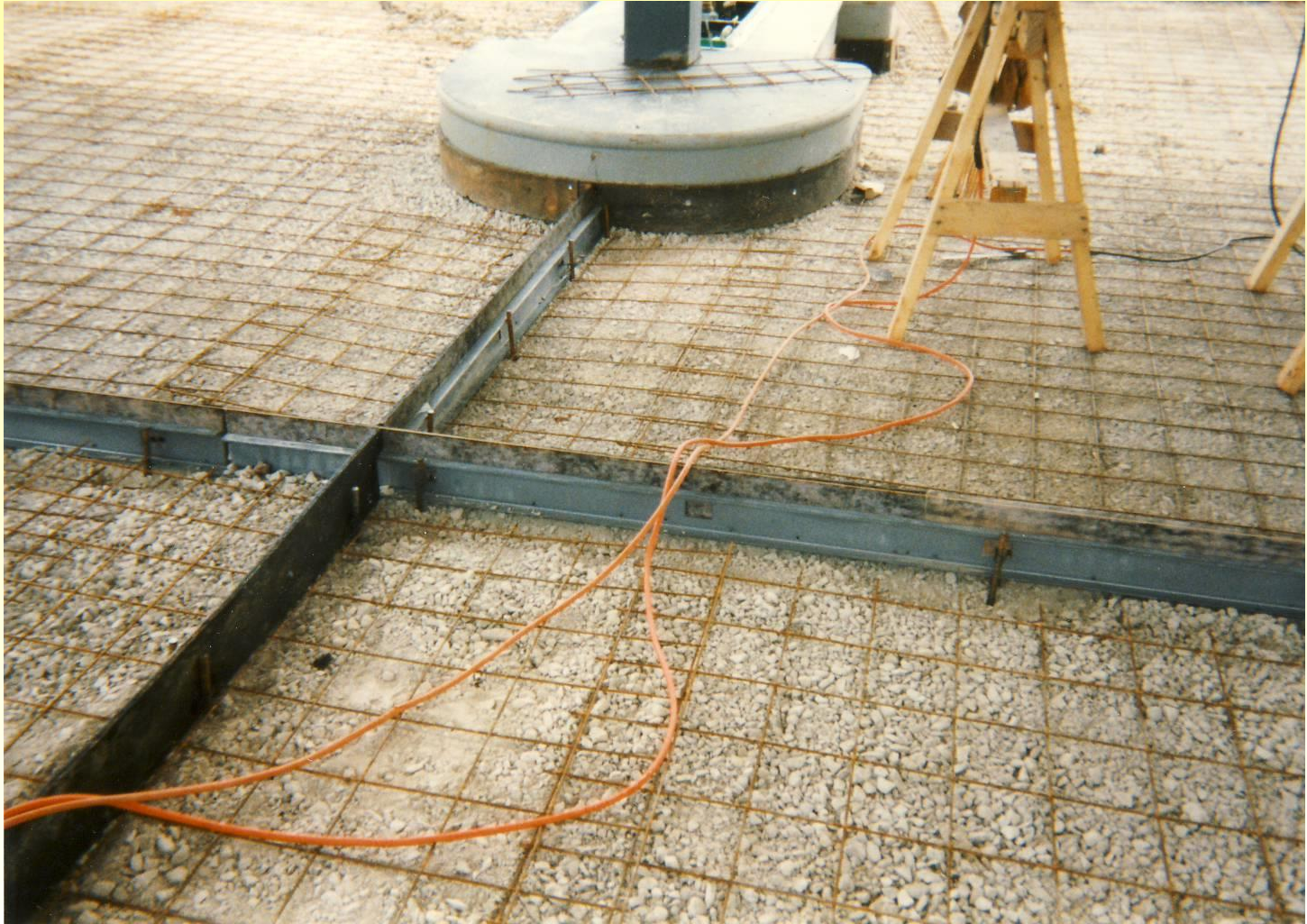




# Other

- **Use surface impoundment in preference to underground.**
- **Conjoin concrete slabs where appropriate**
- **Joint concrete with care**
- **Use island forms with care**
- **May pond on lot up to 6", but no pond over tanks.**
- **Add lighting to provide min. 1 fc on any paved area**
- **Provide sufficient lighting for safe, accurate tank deliveries.**

# Take Care With Joints



# Take Care With Joints



# Installation Planning

## **Safety and Emergency Controls:**

- **Provide clearly labeled and accessible emergency controls as prescribed by NFPA 30A or the Authority Having Jurisdiction .**
- **Provide appropriate fire-fighting apparatus as prescribed by the Authority Having Jurisdiction.**
- **Provide communications intercom to allow interaction of site operator and refueling customer**
- **Provide appropriate safety and instructional signage at each refueling point.**
- **Provide only electrical equipment and installation details appropriate for the NFPA 30 classified area contemplated in the operational configuration of the facility.**

# Installation Planning

## Piping details:

- **Consider future access from the standpoint of completed condition configuration. For example, what is installed at waist height may be waist-deep in a manway when in its operating configuration.**
- **Ball valve handles should be visible, accessible and operable without interference with other objects. They should never have their handles installed on the blind side to a maintenance person.**
- **Impact valve test ports should be accessible through the dispenser door, without removal of other panels.**
- **Provide sufficient pipe-to pipe clearance to allow installation of termination fittings, such as vent caps.**

**Easy to work on**



# Hard to work on

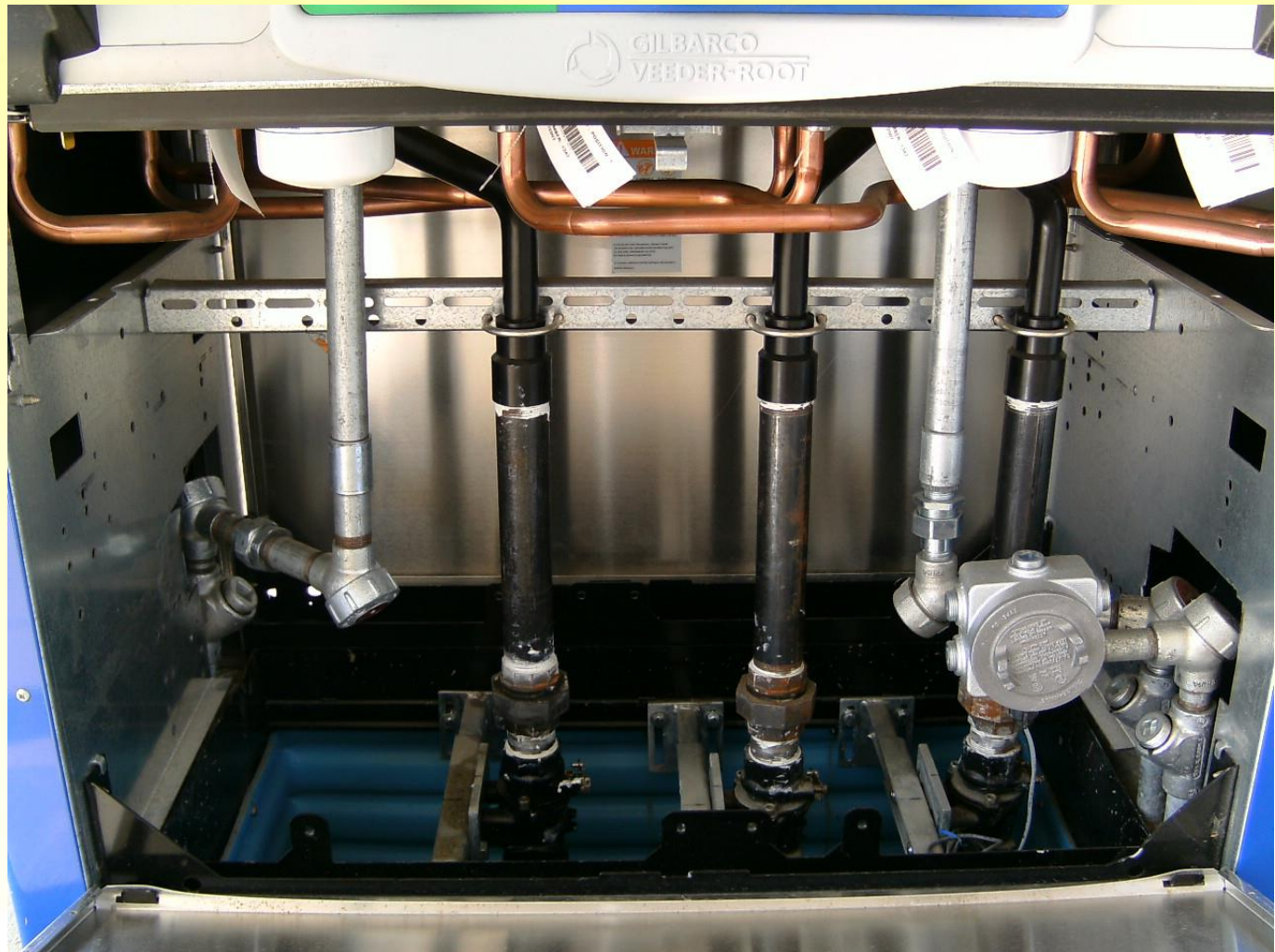


# Installation Planning

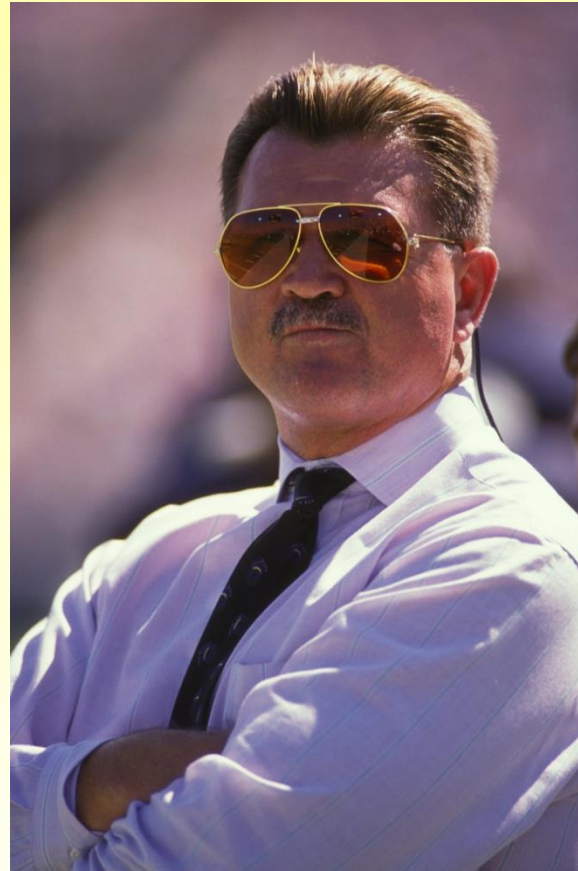
- **Curb boxes should be centered over risers and sumps to facilitate access.**
- **Clearance should be provided between underground fixtures and street box covers to allow for settlement.**
- **Electrical piping under dispensers and inside tank sumps should be routed to allow access to maintenance items such as filters, shear valves, extractor fittings and shut-off piping.**
- **Risers for tank probes and submersible pumps should be installed at a height easily accessible from the surface with clearance on all sides.**
- **The use of expansion joints around any structure projecting from slabs, such as bollards, canopy columns, and dispenser islands is recommended to reduce concrete spalling.**



**Easy to work on**



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise





# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise





# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



# Test Your Expertise



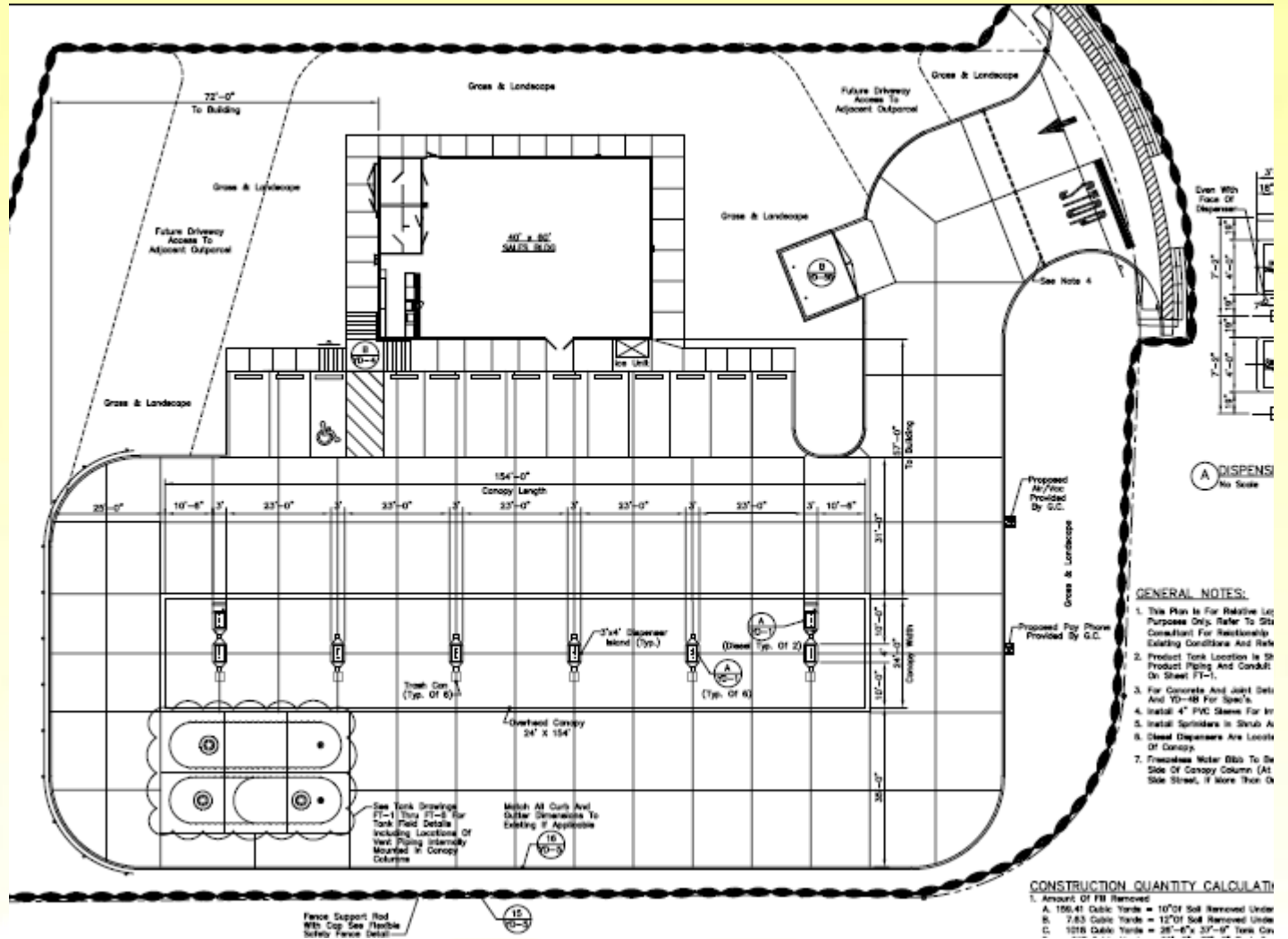
# Test Your Expertise



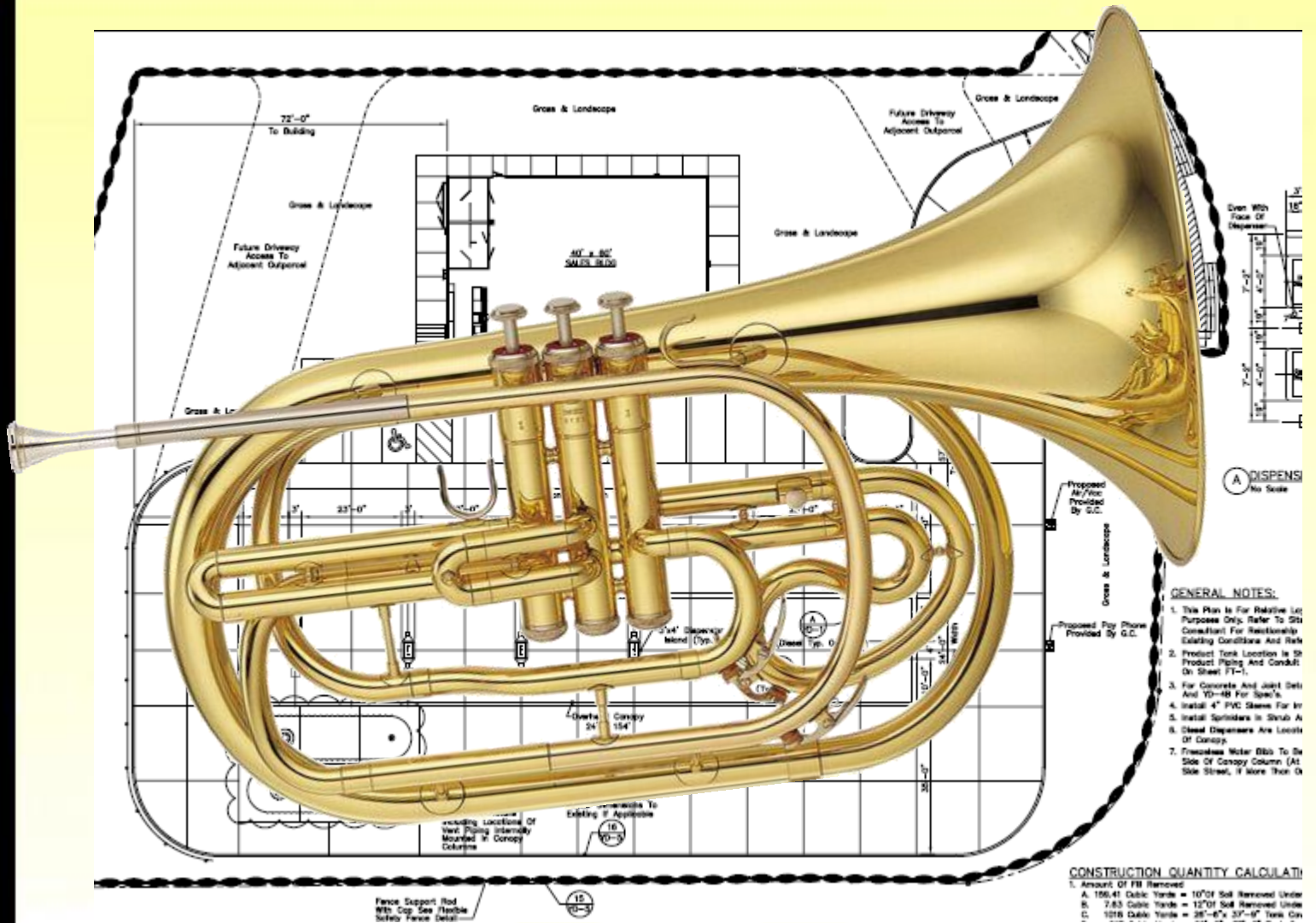
# Test Your Expertise



# Worst Layout Ever?



# Worst Layout Ever?





# Q & A

**How can we help?**



## Contact info



# JGD

**ASSOCIATES, INC.**

92 MOORE ROAD

AVON LAKE, OHIO 44012

Phone: (440) 933-6825

Fax: (866) 856-0953

[www.jgdpe.com](http://www.jgdpe.com)

[jdzwonczyk@jgdpe.com](mailto:jdzwonczyk@jgdpe.com)