Sutphen Rear Mount Aerial Ladder (SLR) Project

Start December 2014

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Start December 2014

SLR75

HS-5587 Demo 404 (Eden, NC)

- First build
- Double high split depth body
- Full depth main hose bed
- Sliding tool board and stokes box
- Large L1 and R1 compartments
- 3 single stack crosslays
- Lots of compartment space


SUTPHEN
SLR 75


KEEP
BACK
343 FT.


S3UV

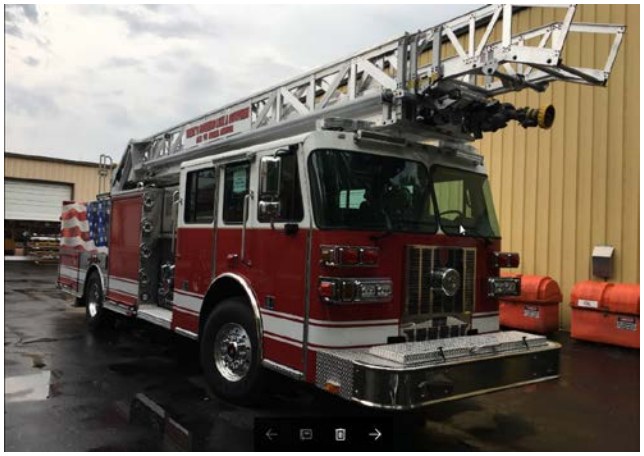

SUTPHEN
SLR 75

How do we improve?

- Recess rear access ladder
- More hose storage options
- Easier access to dunnage area equipment
- Need to increase rear suspension GAWR
- Eliminate slam door over outriggers
- Hydraulic tank is difficult to install and service
- Simplify hydraulic system and reduce the number of parts
- Add service access to hydraulic and electrical components in body

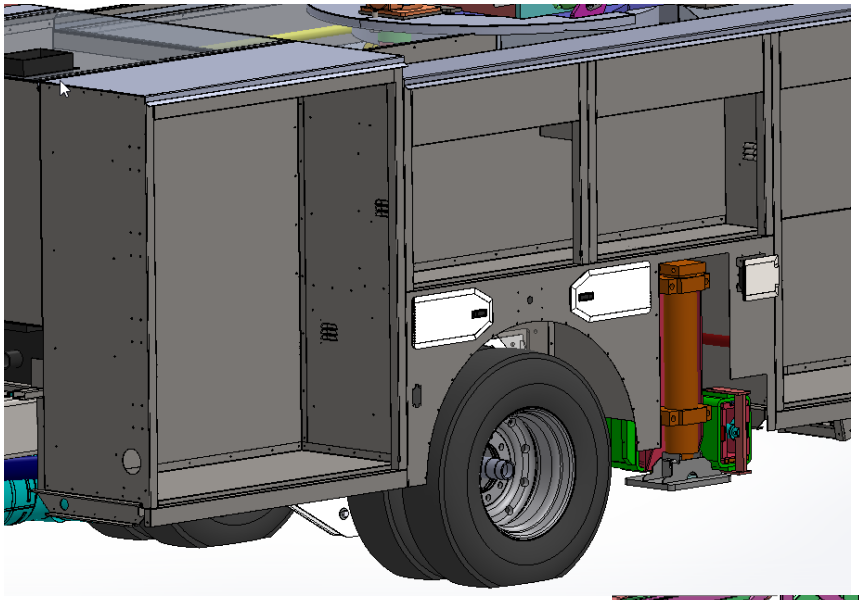
HS-5901 Demo 429
(Elkhart, IN)

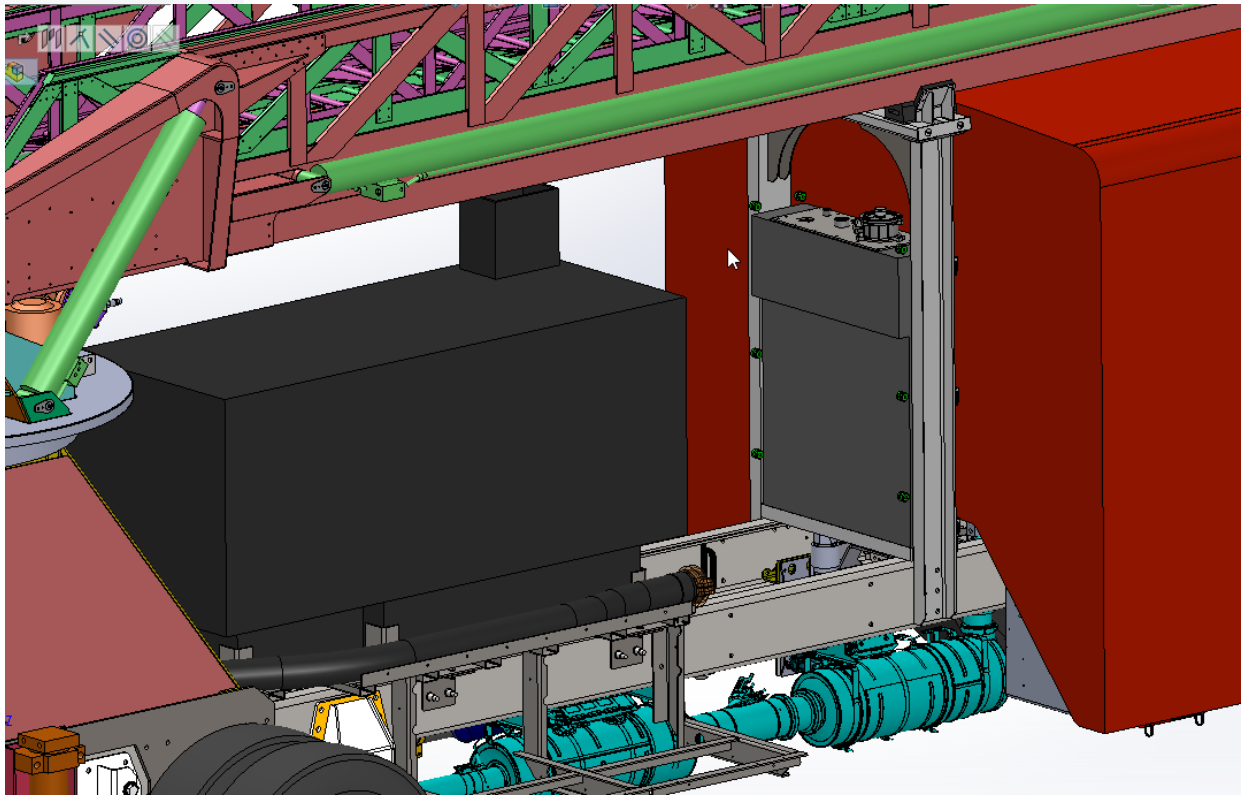
- Second Build
- Side Stacker hose bed
- Full depth L1 compartment
- Aerial access ladder recessed in body
- Service access panel on rear of body
- 8” tailboard for pike pole accessibility
- Easier rear tow eye access
- Compartments over wheel well for long handle tools
- 35K rear suspension
- Bolt on dunnage panels for cord reel and generator access.
- Hydraulic tank moved inside of cradle utilizing unused space.
- Simplified water tank
- New multiple function hydraulic combination block (Boat Anchor)




SLB 75 AERIAL LADDER


S3UV





HS-5964 Pinellas Park, FL

- First Customer Spec. Build
- New pump module dunnage options
  - Deadlay hose
  - Scoop stretcher
  - Backboard
- Waterous pump
- 73” cab
- Cord reel mounted in rear of body
- Storage compartment above cord reel
- 3 Position Aerial Intercom

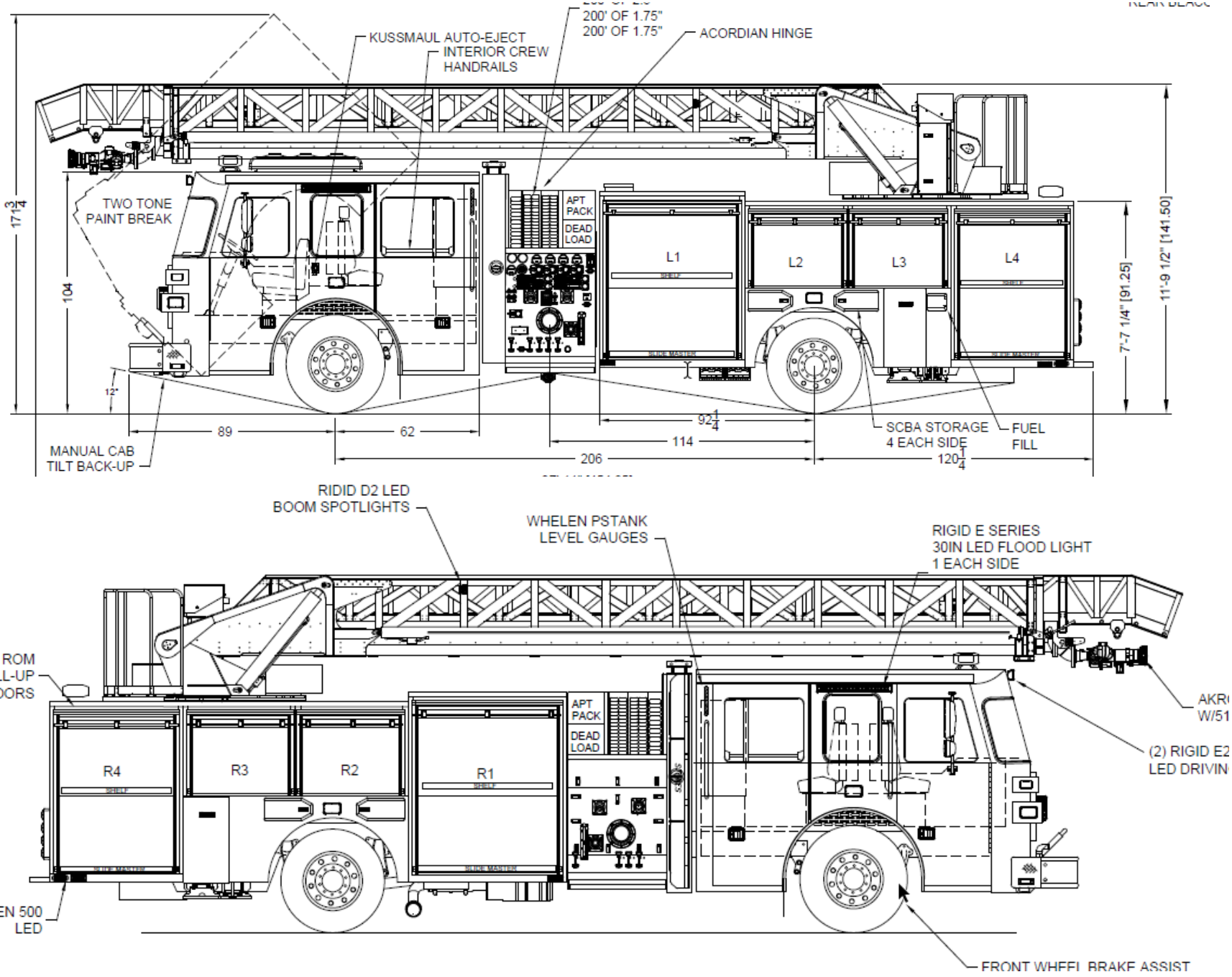

PINELLAS PARK FIRE
35

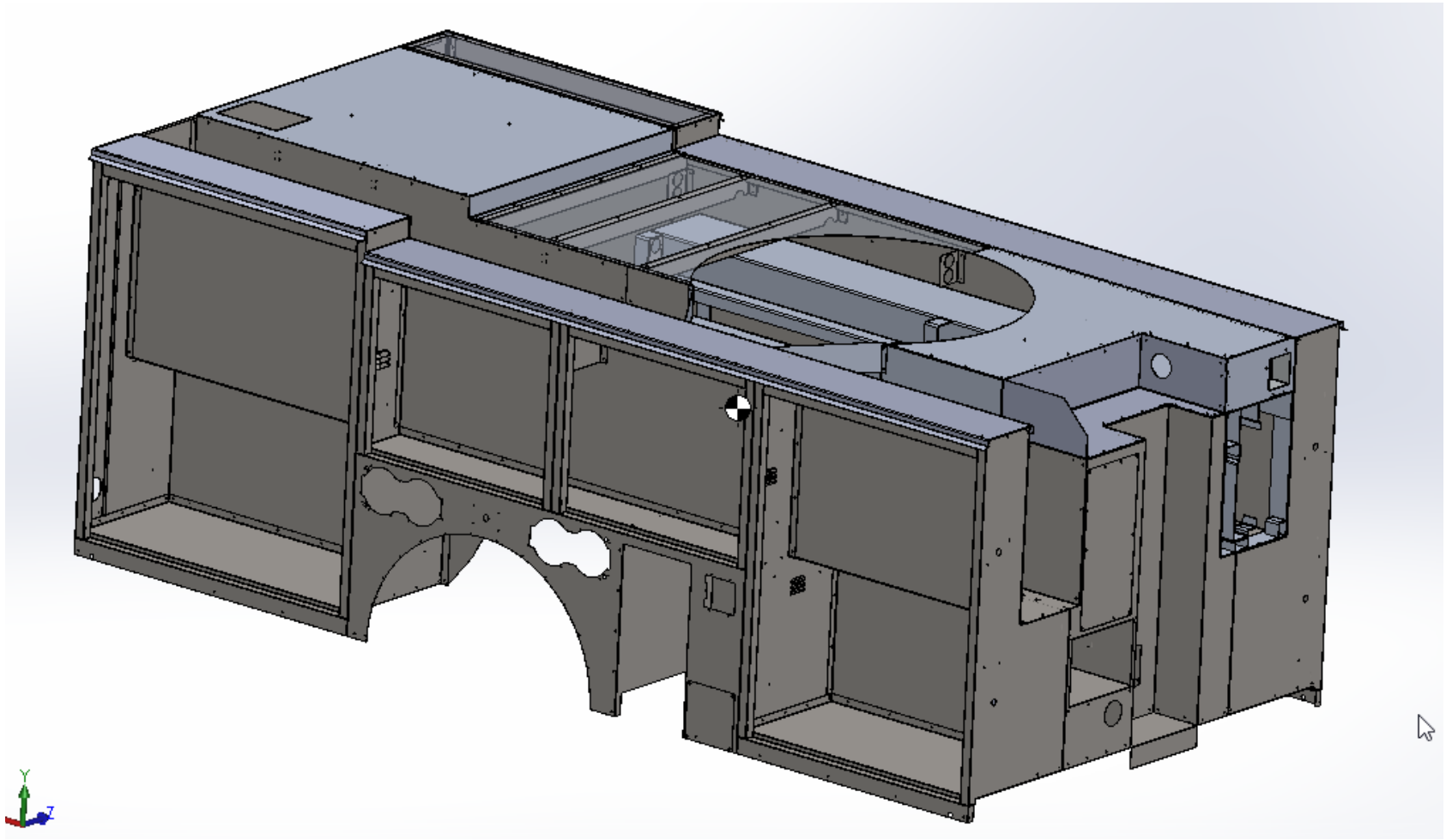

SUTPHEN


PINELLAS PARK FIRE
35

HS-6007 Painesville, OH

- Currently under construction
- Similar dunnage area as Pinellas Park
- Storage compartment at rear of body
- Double high split depth body
- Custom hose bed configuration
- Rear discharge in main hosebed

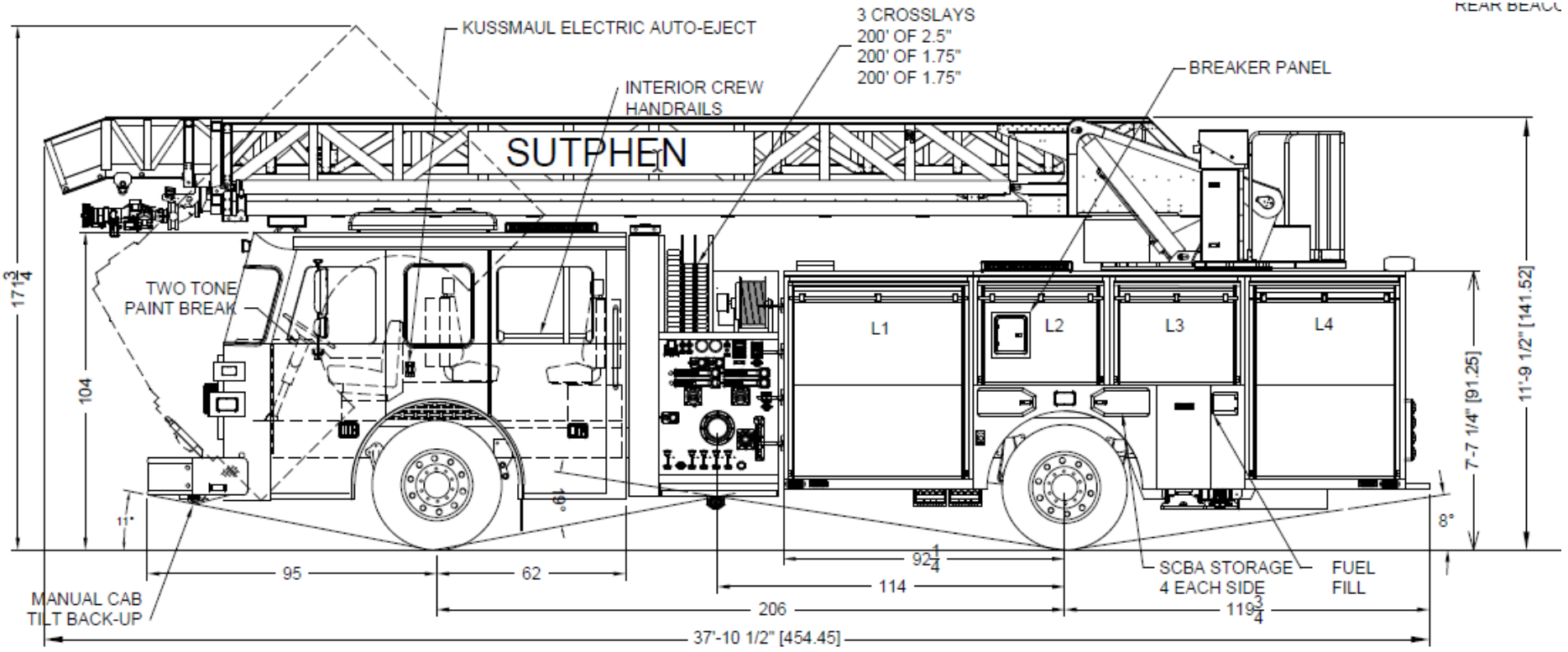

KUSSMAUL AUTO-EJECT
INTERIOR CREW HANDRAILS
200' OF 1.75"
200' OF 1.75"
ACORDIAN HINGE
TWO TONE PAINT BREAK
APT PACK
DEAD LOAD
L1
L2
L3
L4
171 3/4
104
12"
89
62
92 1/4
114
206
120 1/4
7'-7 1/4" [91.25]
11'-9 1/2" [141.50]
SCBA STORAGE 4 EACH SIDE
FUEL FILL
MANUAL CAB TILT BACK-UP
RIDID D2 LED BOOM SPOTLIGHTS
WHELEN PSTANK LEVEL GAUGES
RIGID E SERIES 30IN LED FLOOD LIGHT 1 EACH SIDE
ROM ROLL-UP DOORS
R4
R3
R2
R1
APT PACK
DEAD LOAD
(2) RIGID E2
LED DRIVIN
WHELEN 500 LED
FRONT WHEEL BRAKE ASSIST

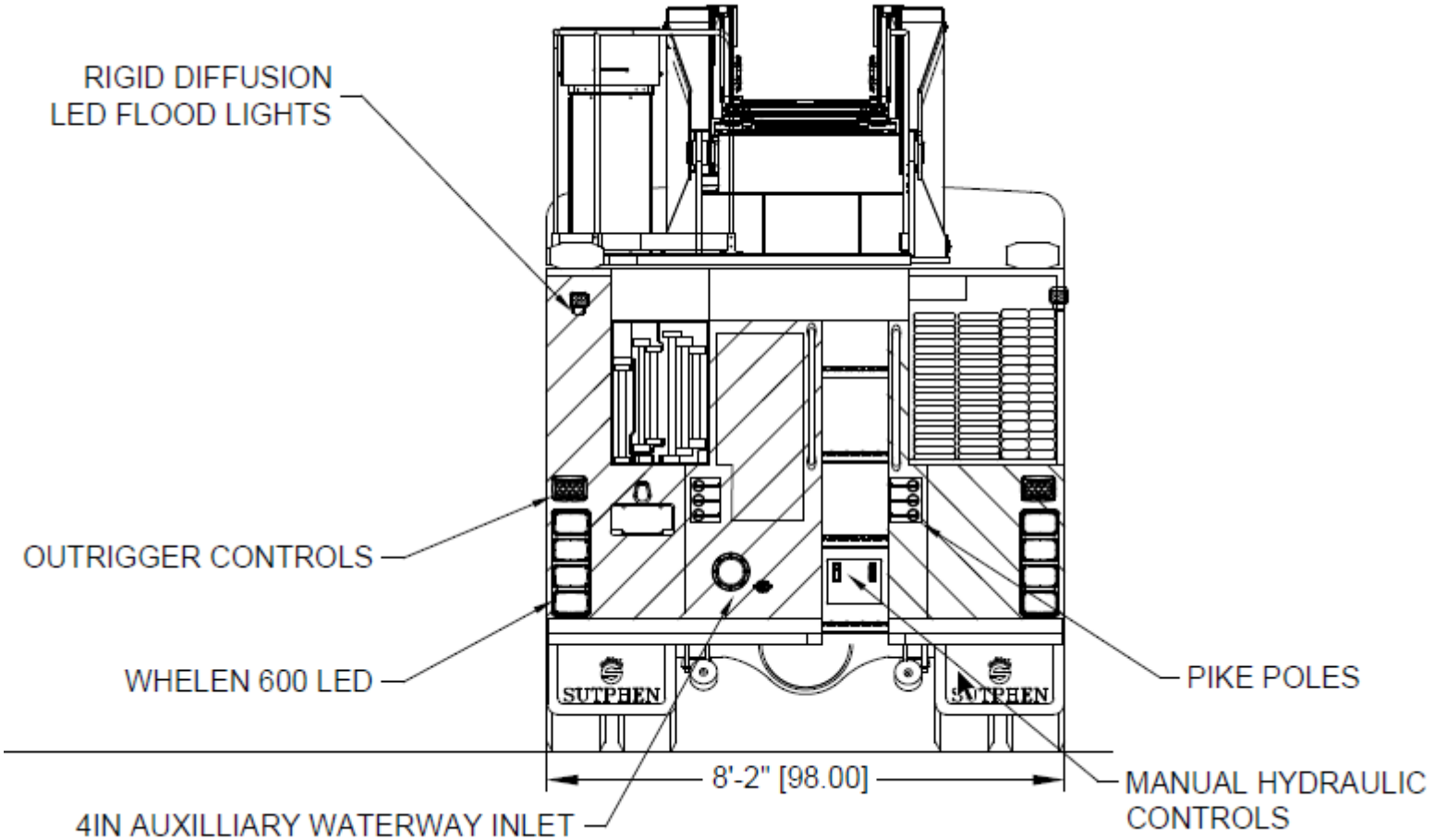


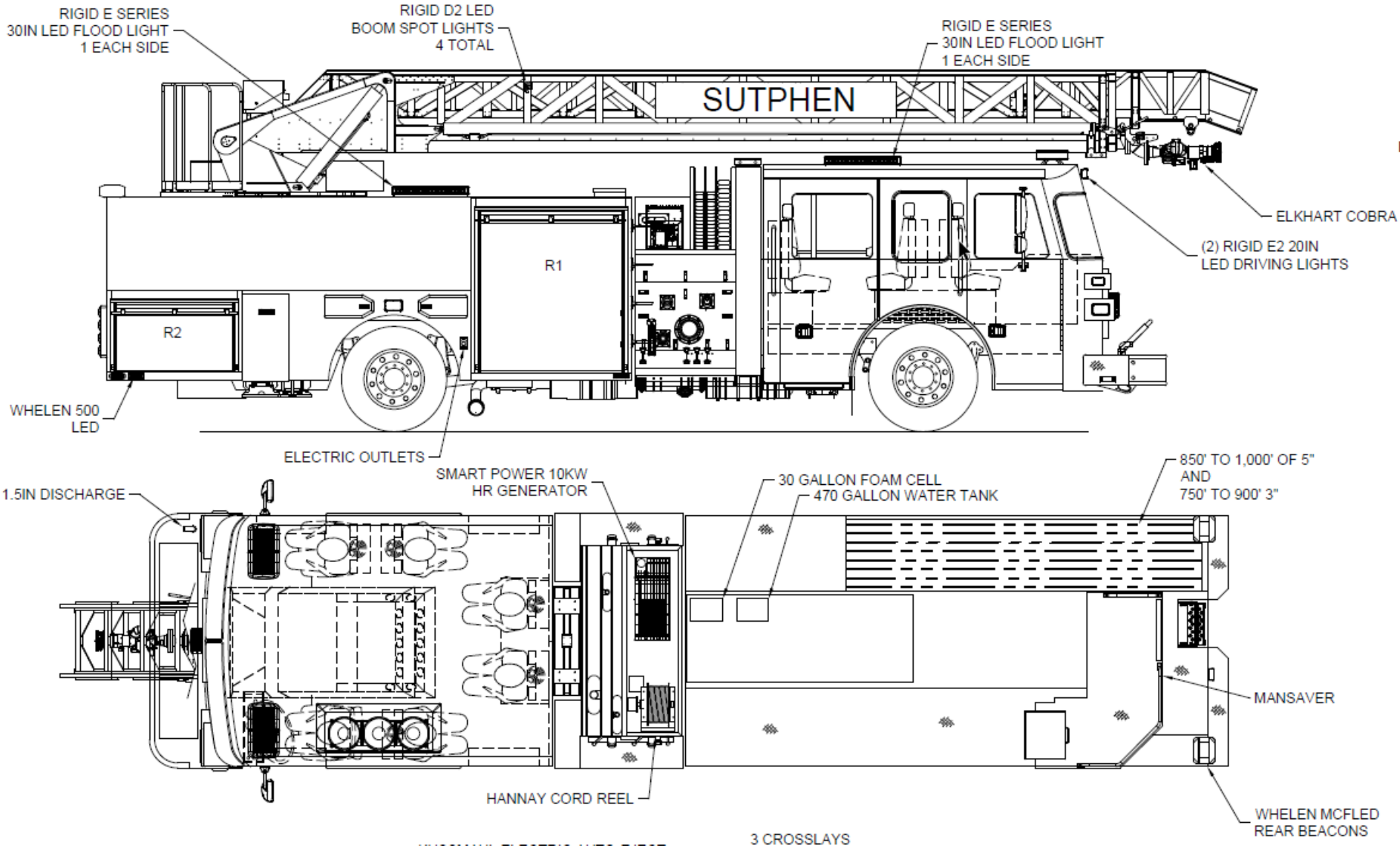
How do we improve?

- Move outrigger hydraulic hoses inside of jack tubes
- Lower L1 and R1 body height to eliminate door roll issues with very tall door
- Move pike poles down low outboard of frame rails increasing compartment volume
- Develop fixed rear access ladder with easy installation and removal for service access
- More space is needed between turntable and body.
- Redesign turntable deck to be lighter and easier to install.
- Improve pedestal design for better service access and reduced manufacturing cost.
- New body design with ground ladders on the driver side and full width, side stacker hose bed on the officer side
- Improve hydraulic tank design and reduce volume
- Improve access to plumbing, tank fill and tank-to-pump connections
- Improve side-stacker body design to reduce manufacturing costs
- Establish standard locations for hydraulic components
- Establish standard body configurations for SQS2

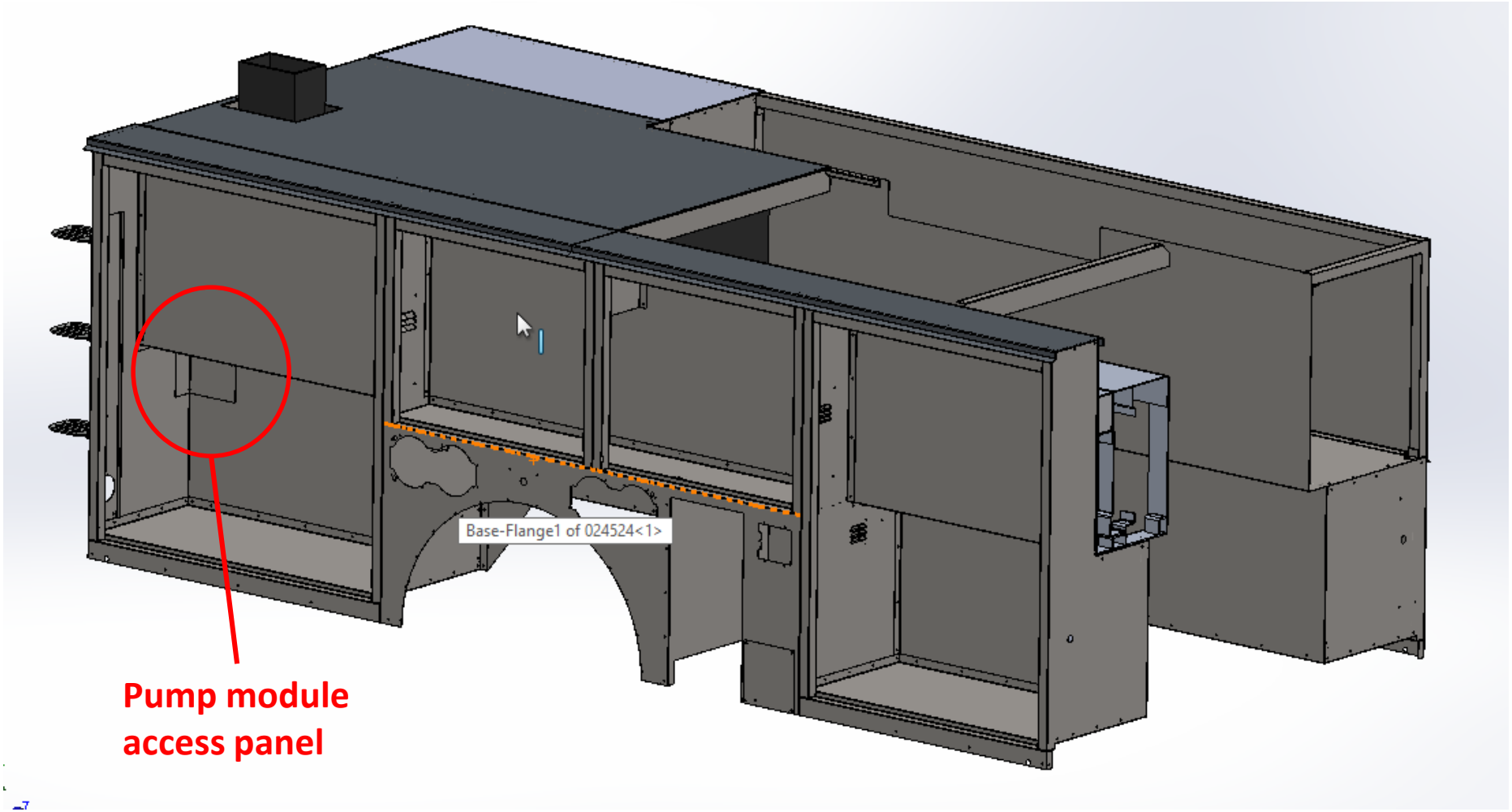
HS-6118 Demo 438



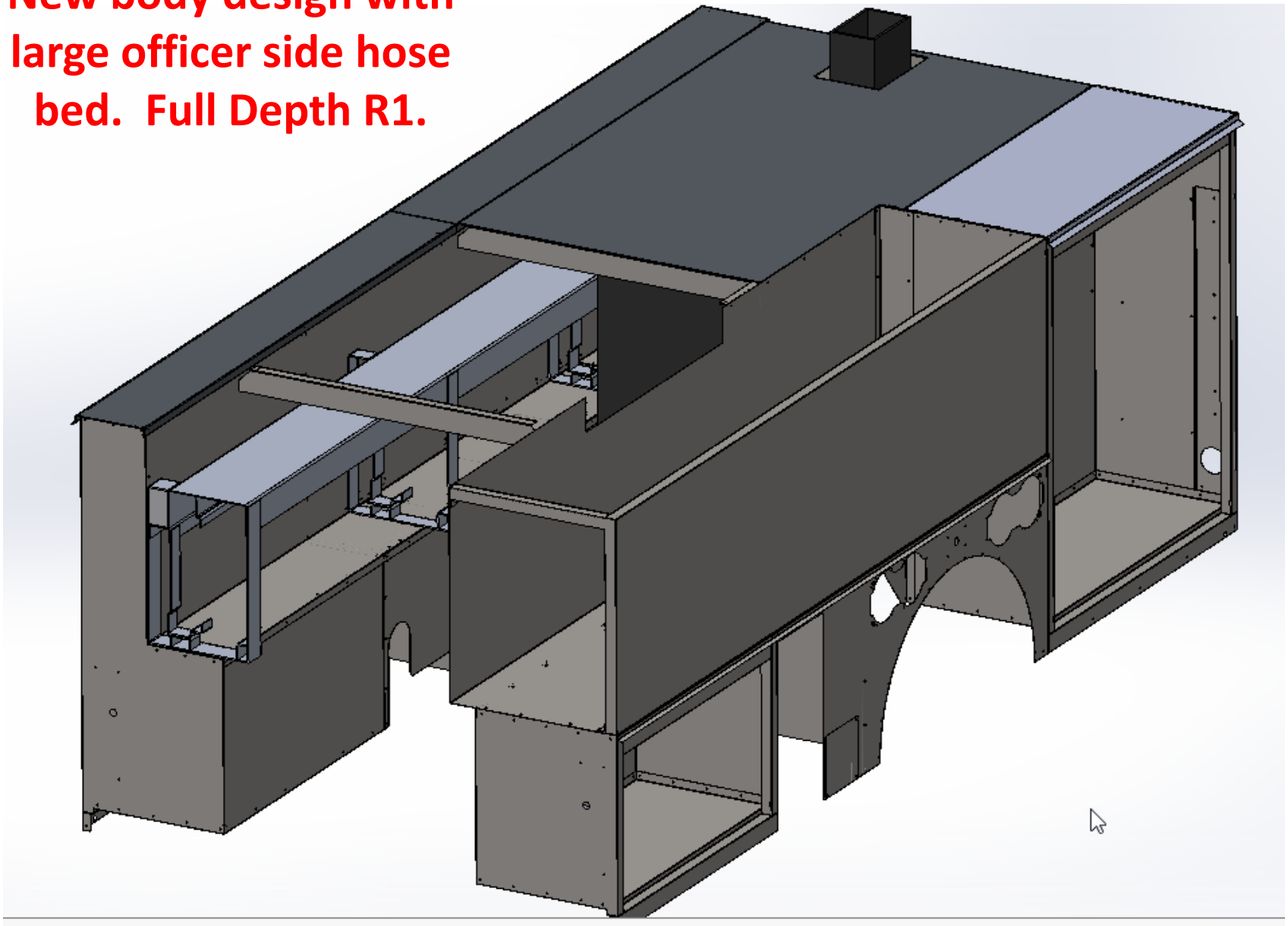

RIGID DIFFUSION
LED FLOOD LIGHTS
OUTRIGGER CONTROLS
WHELEN 600 LED
4IN AUXILLIARY WATERWAY INLET
PIKE POLES
MANUAL HYDRAULIC
CONTROLS
8'-2" [98.00]
SUTPHEN
SUTPHEN


RIGID E SERIES
30IN LED FLOOD LIGHT
1 EACH SIDE
RIGID D2 LED
BOOM SPOT LIGHTS
4 TOTAL
RIGID E SERIES
30IN LED FLOOD LIGHT
1 EACH SIDE
SUTPHEN
ELKHART COBRA E
(2) RIGID E2 20IN
LED DRIVING LIGHTS
R1
R2
WHELEN 500
LED
ELECTRIC OUTLETS
1.5IN DISCHARGE
SMART POWER 10KW
HR GENERATOR
30 GALLON FOAM CELL
470 GALLON WATER TANK
850' TO 1,000' OF 5"
AND
750' TO 900' 3"
MANSAVER
HANNAY CORD REEL
WHELEN MCFLED
REAR BEACONS
3 CROSSLAYS

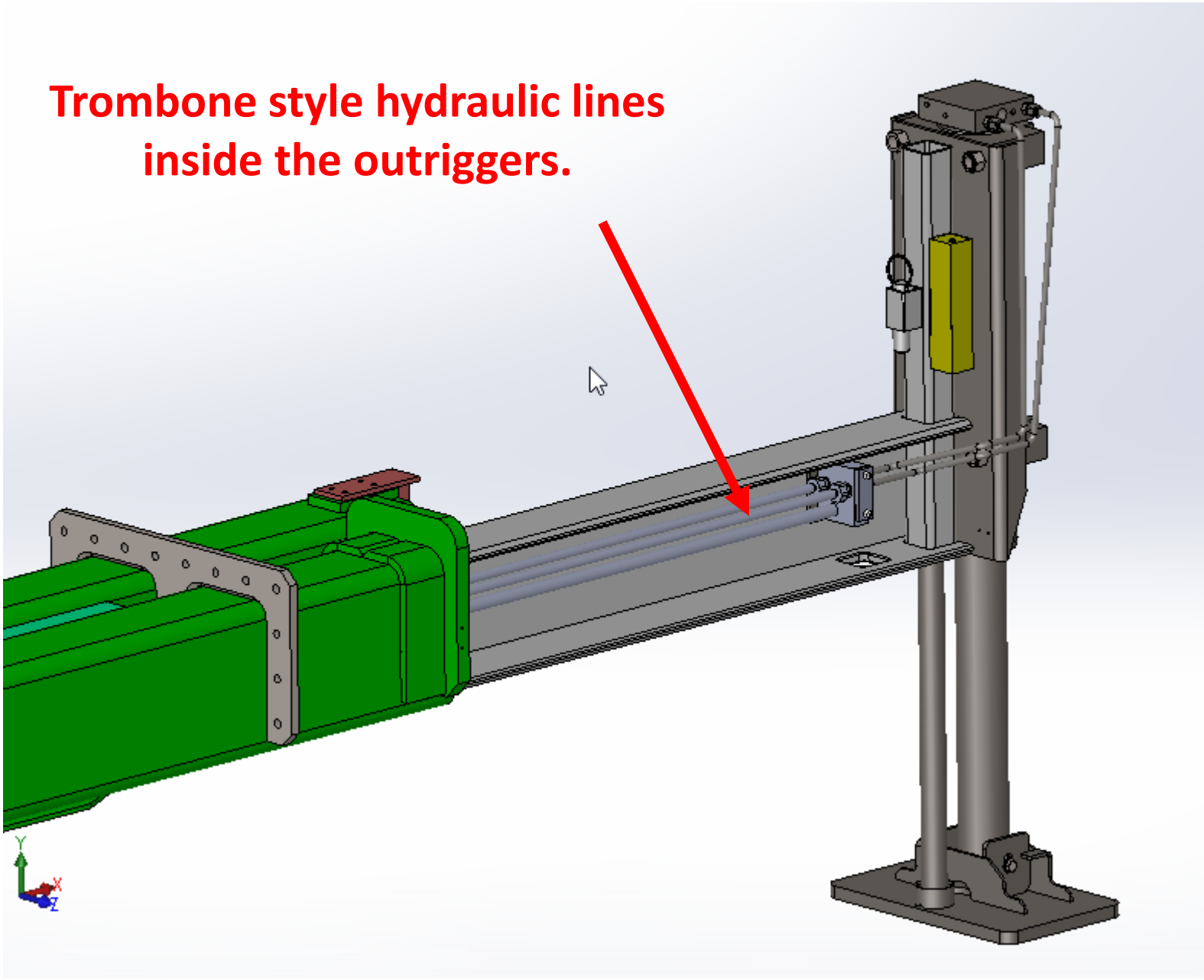
L1 and R1 compartment shortened to be flush with rest of body. No pike poles in top of compartments

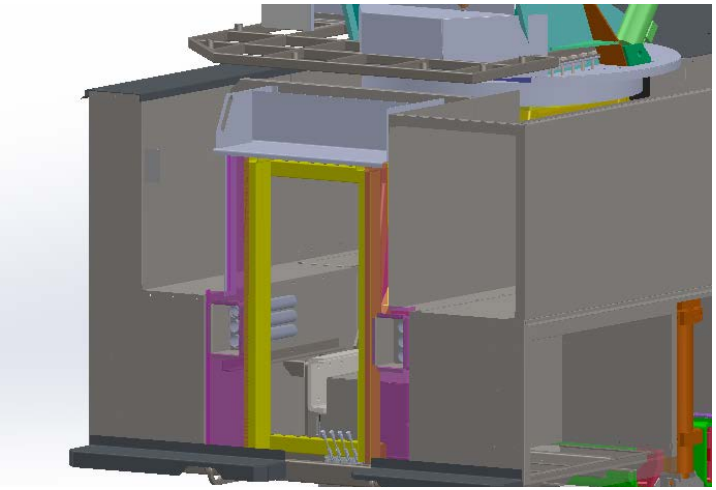


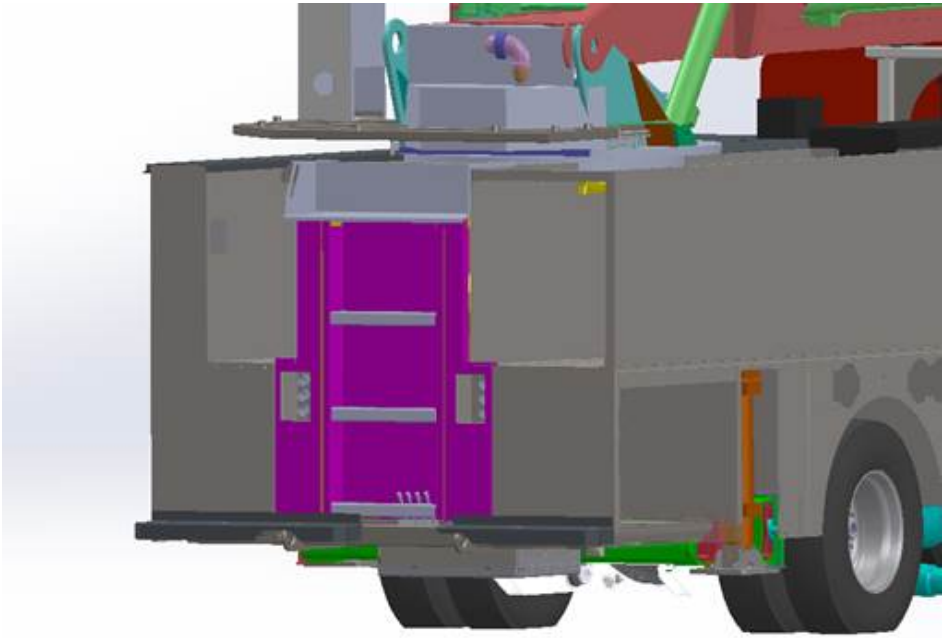
New body design with large officer side hose bed. Full Depth R1.

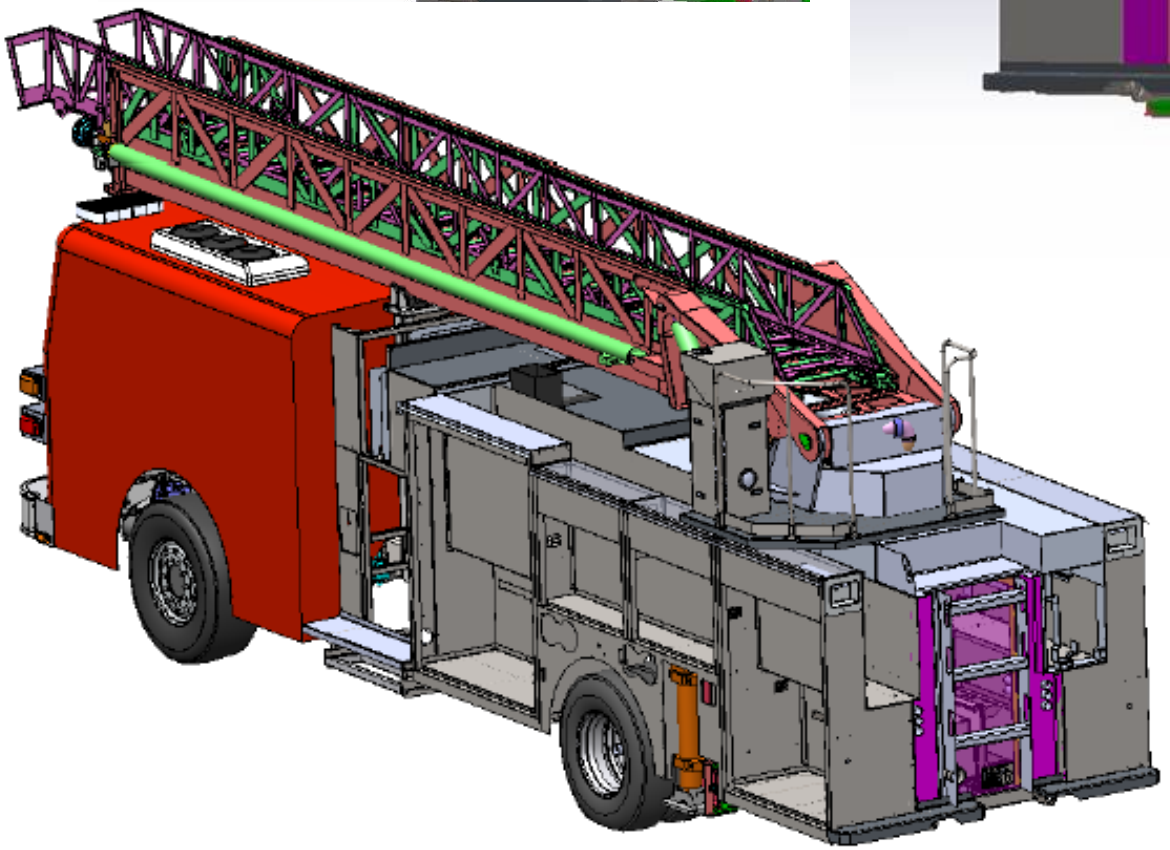


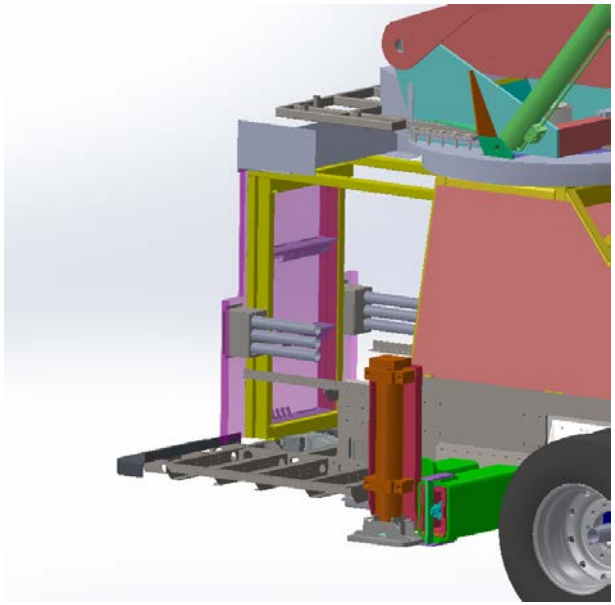
Trombone style hydraulic lines inside the outriggers.

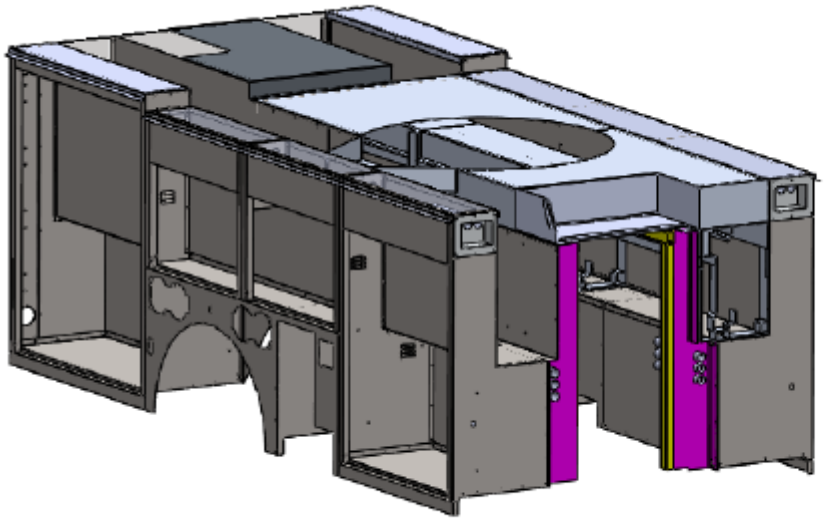




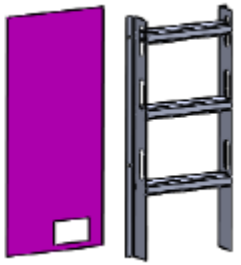




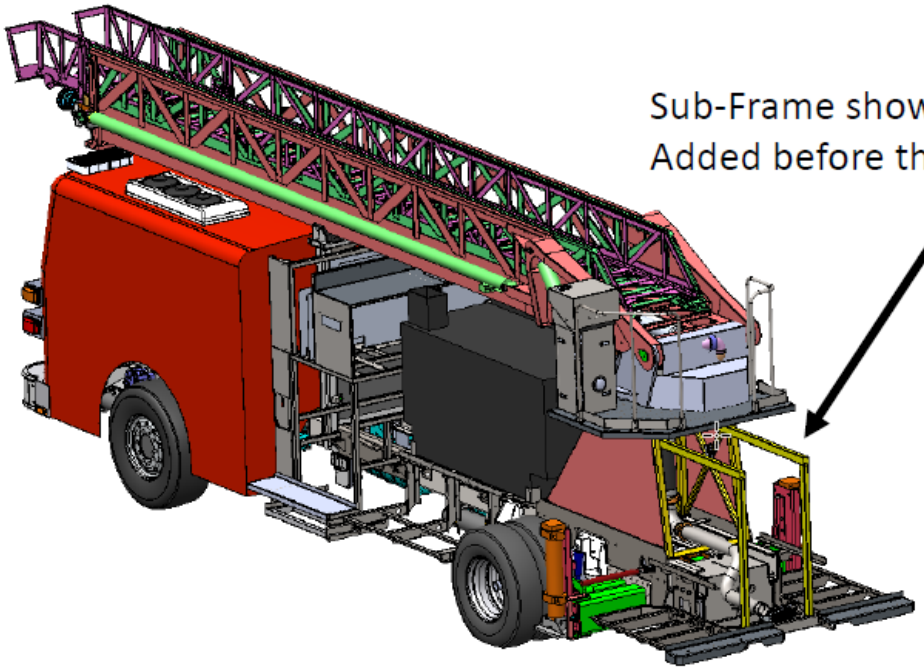




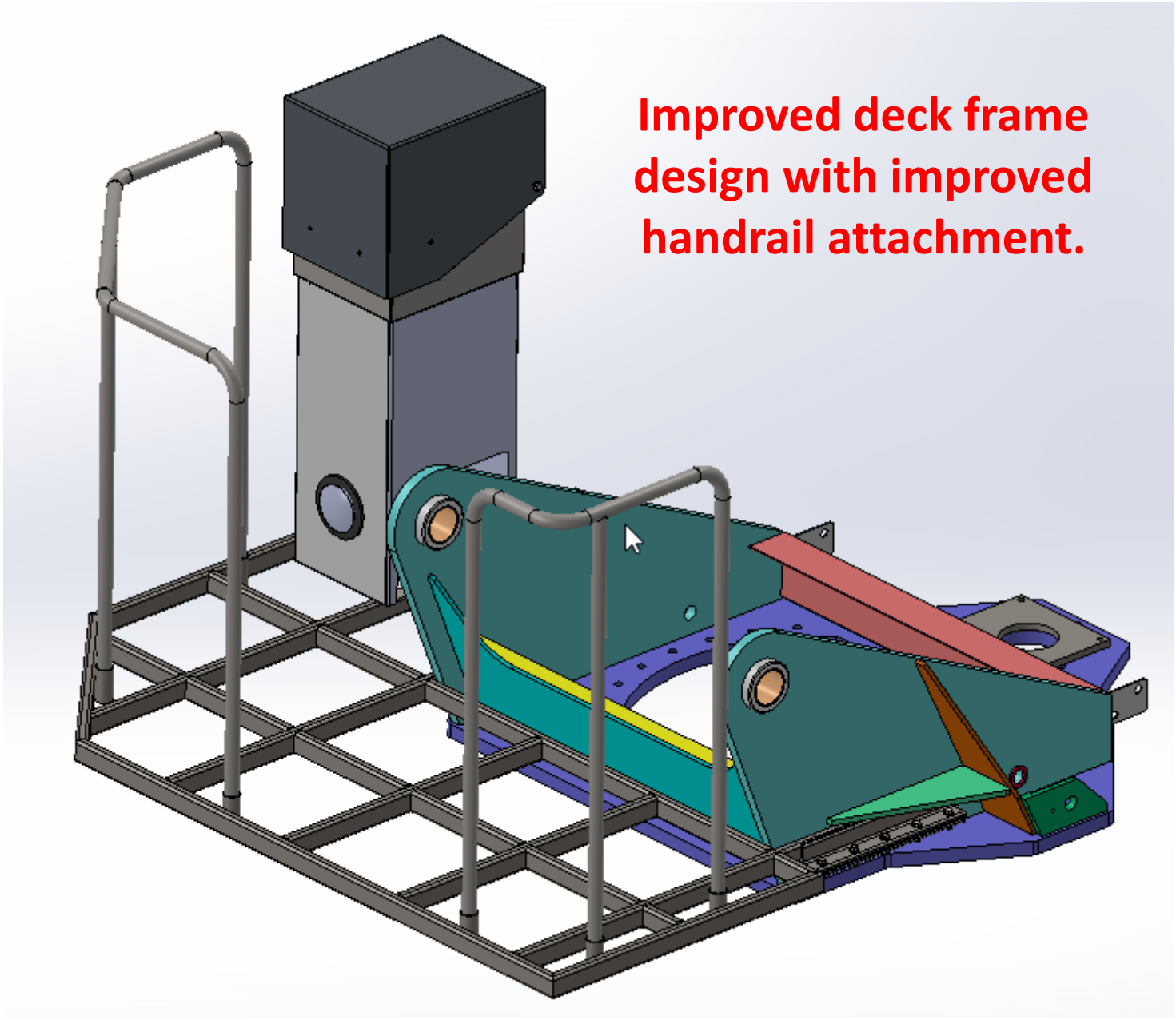
Modular option

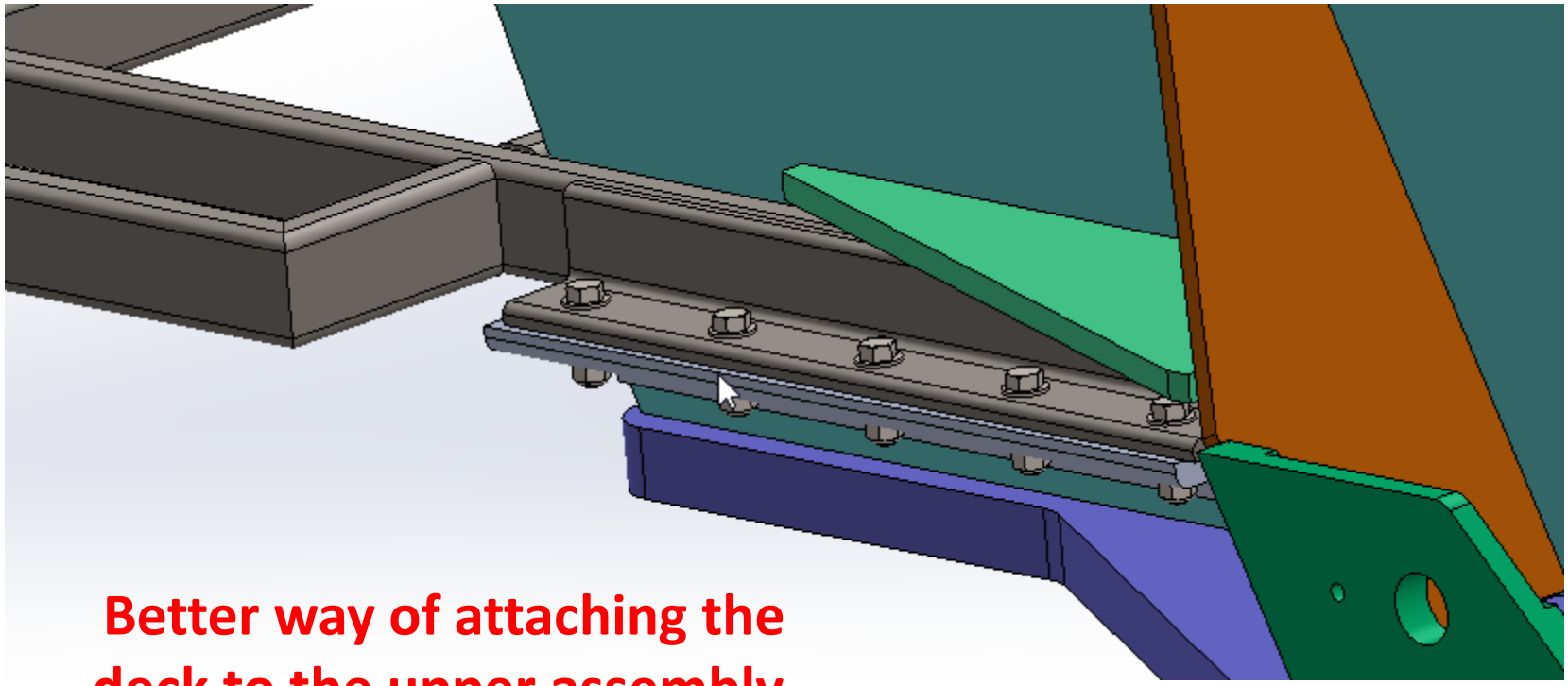


SUTPHEN

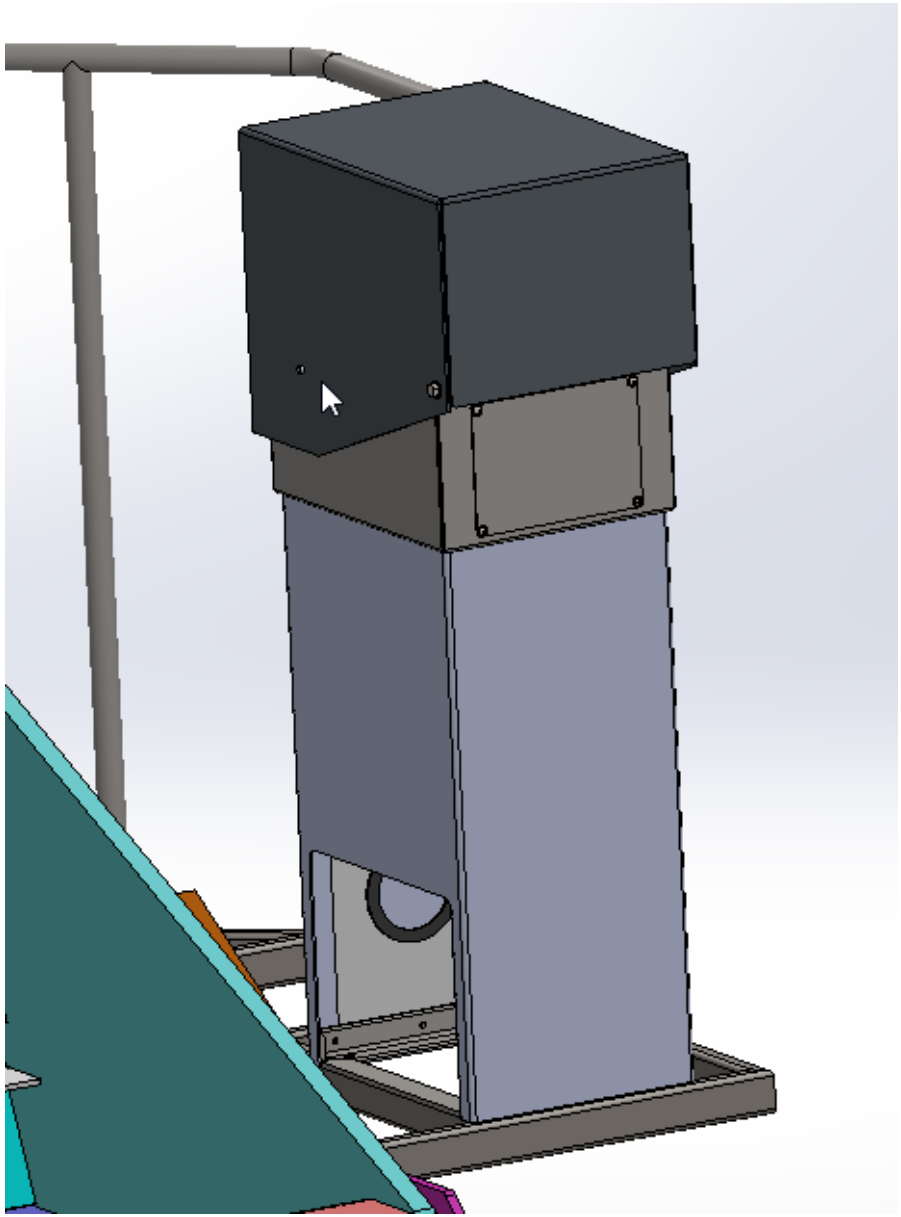


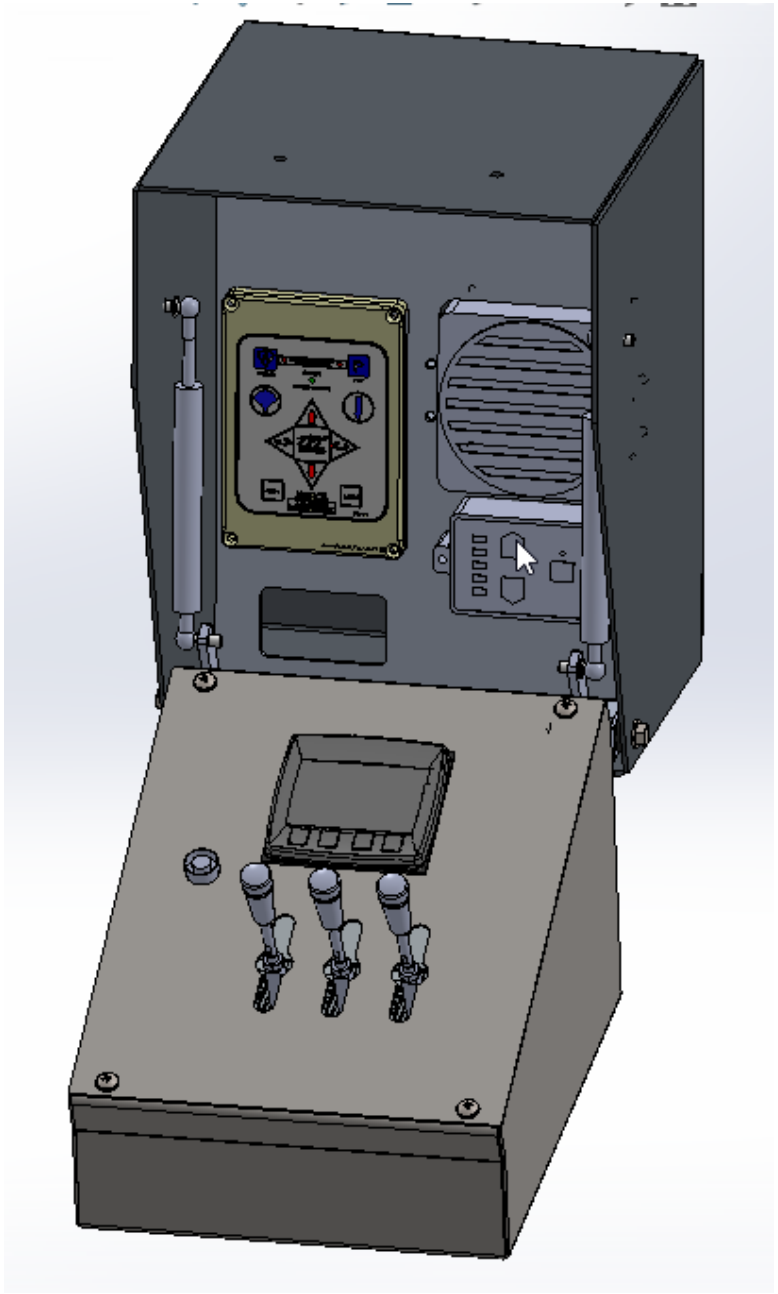
Sub-Frame shown in yellow
Added before the body


Improved deck frame
design with improved
handrail attachment.



Better way of attaching the deck to the upper assembly.





Sutphen Rear Mount Aerial Ladder (SLR) Project

SLR108

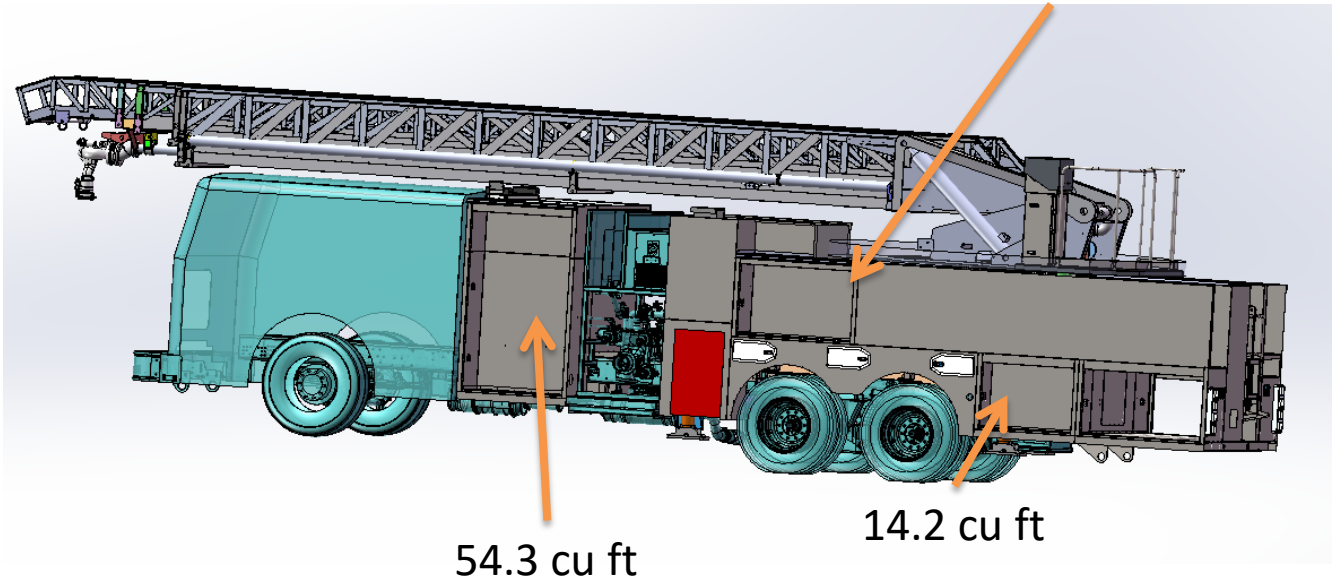
Start May 2016

Pro's

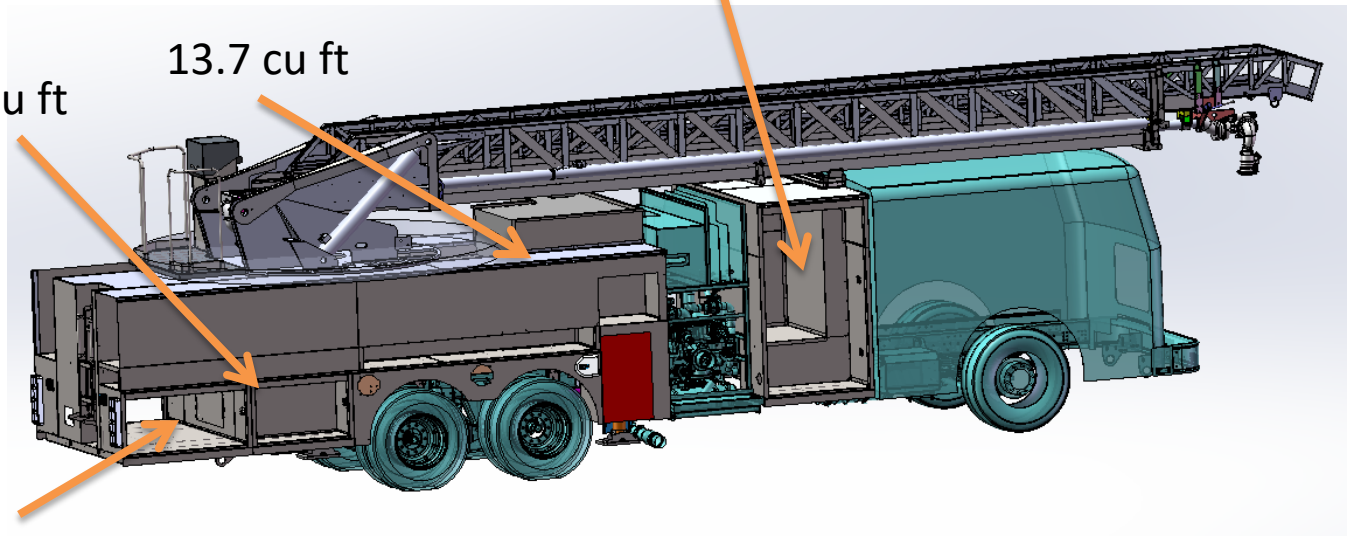
1. Compartment Volume
    a. Transverse Compartment
    b. 8 air bottles
    c. Fans, Stokes, Rescue Tools, etc…
2. Water Capacity (500 gallons)
3. Hose Capacity (up to 1400' of 5"
    or 900' of 5" & 250' of 2 ½")
4. Narrow Jack Span (under 16')
5. 4000 pounds of equipment
6. Same pump module as SLR75

Concerns

1. Weight distribution
    a. Will ISX require 25.5k front axle?
    b. Thin margin with ISL
2. Access to turntable?
3. Cost to build
4. Travel Height ~ 12'
5. Aerial Waterway Flow
6. Tank Flow
7. Vehicle in service weight
8. Stability at rated load

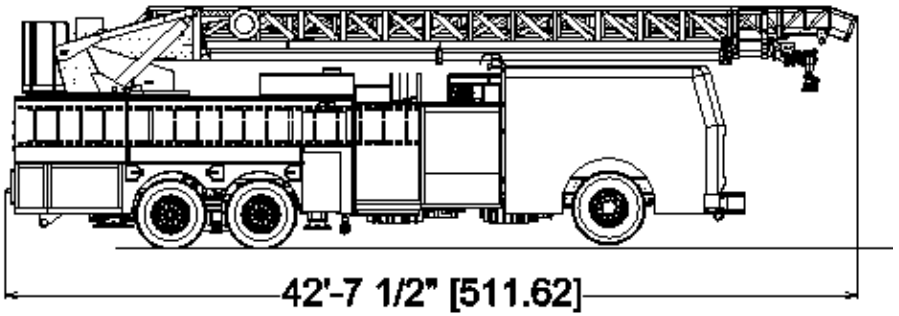


298 cu ft Total

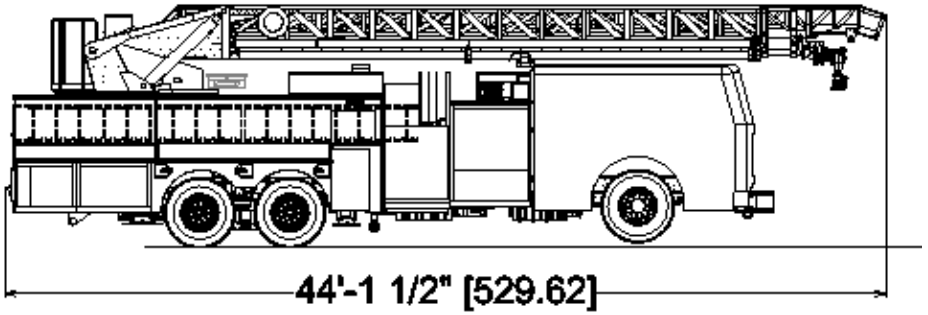


Body Length Options

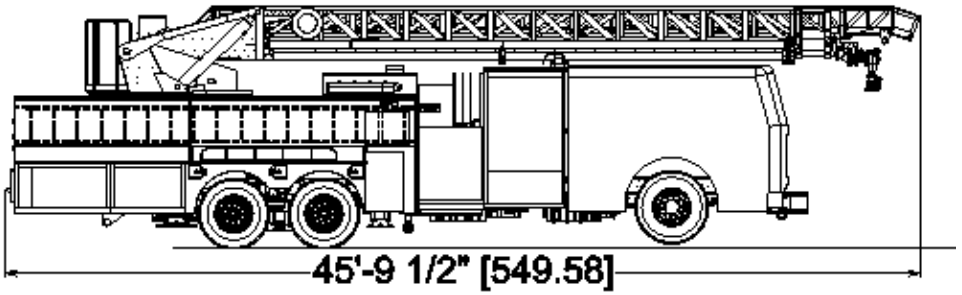
Short
Ground ladders full width of pump module. Limiting crosslays.

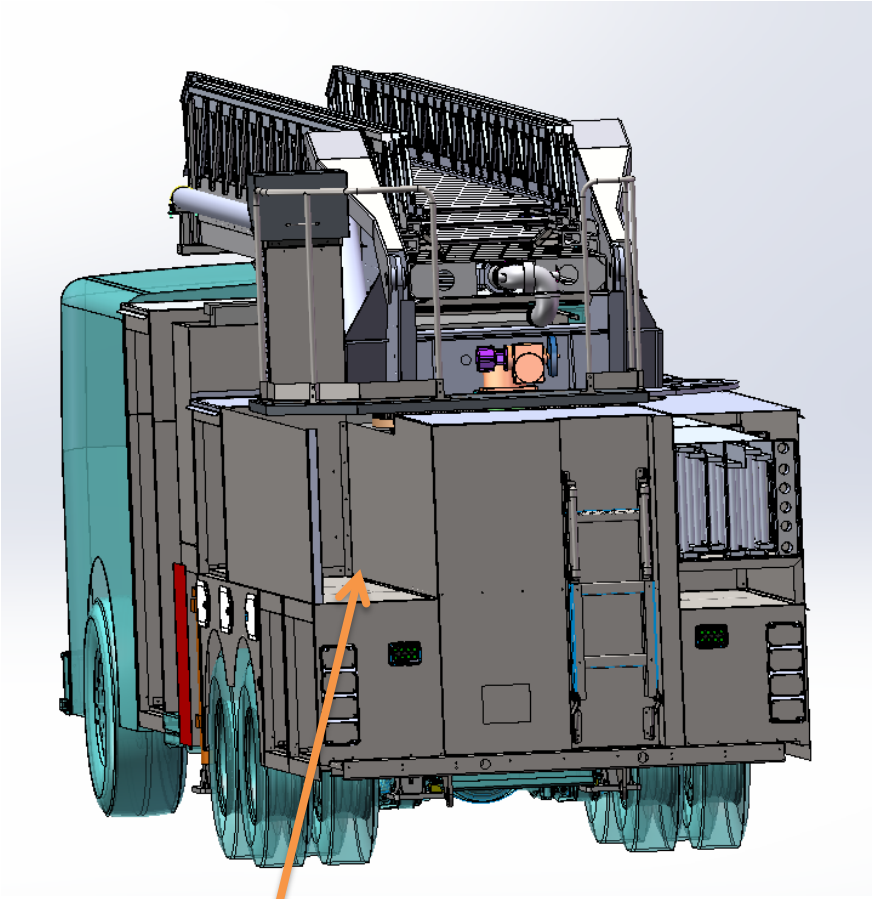


Medium
Ground ladders half width of pump module. Allowing full crosslays.



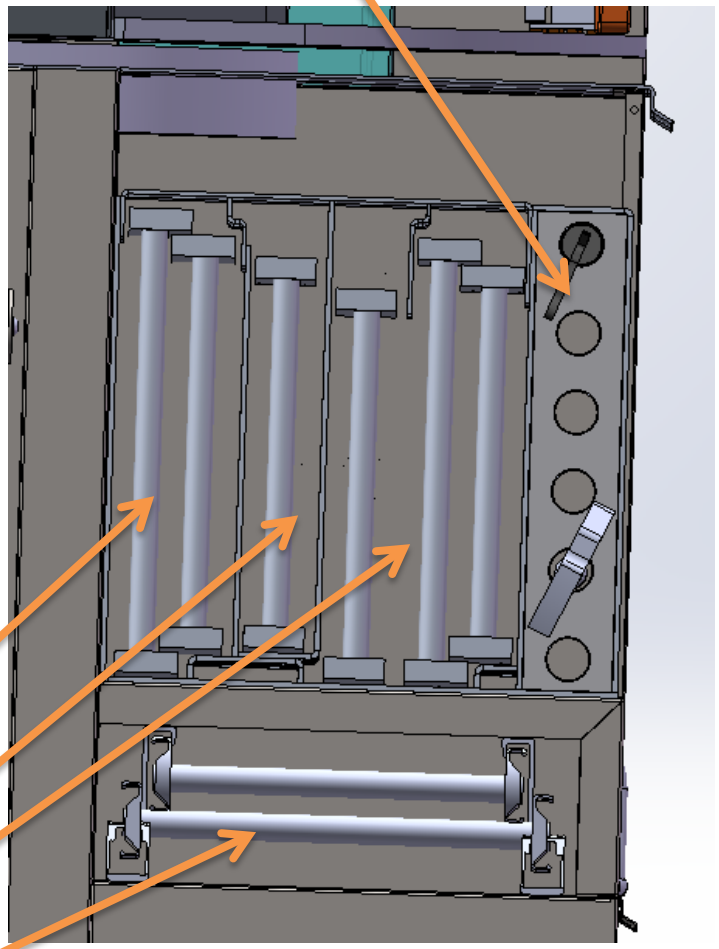
Long
Ground ladders behind pump module. Allowing full crosslays and more plumbing options.



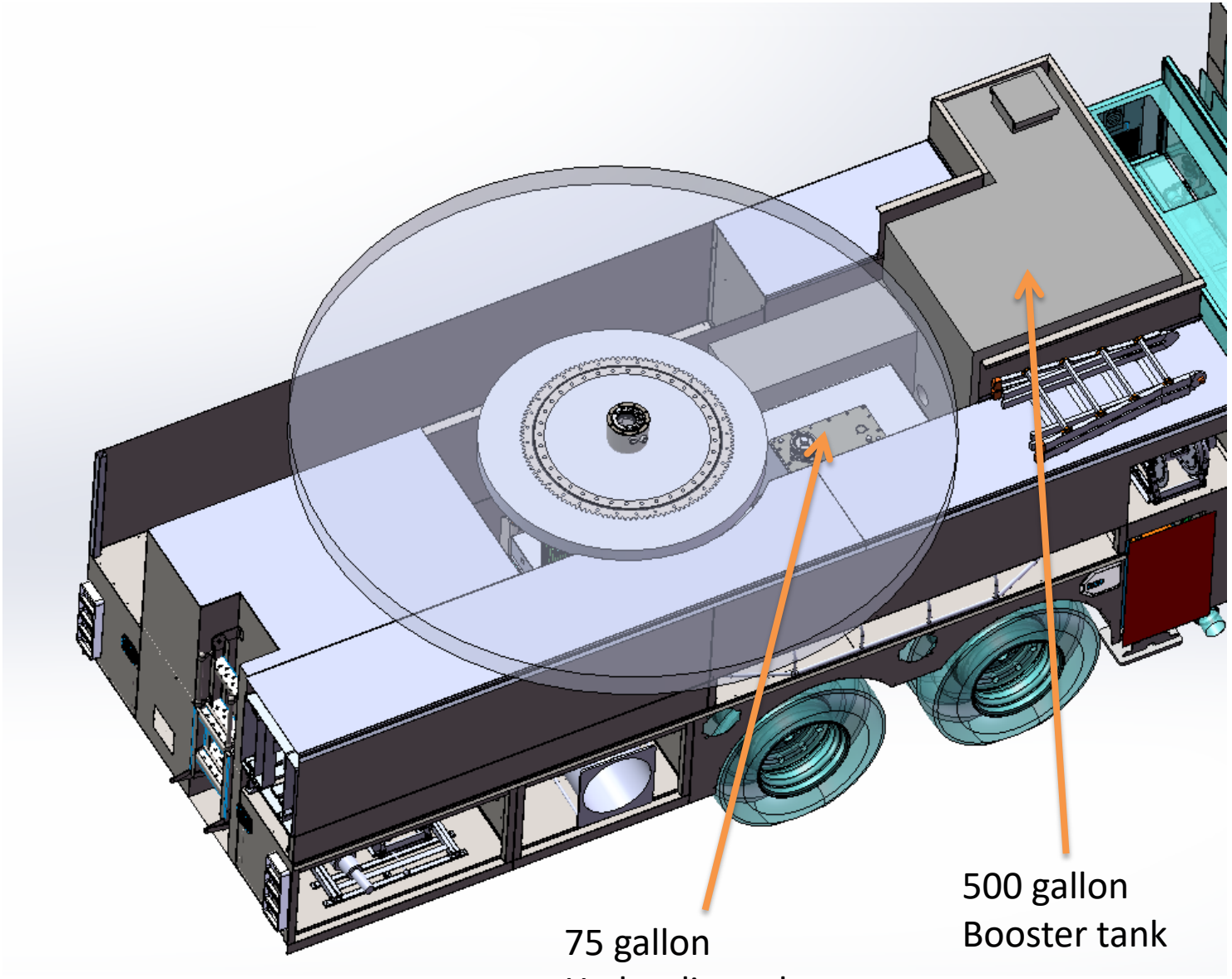


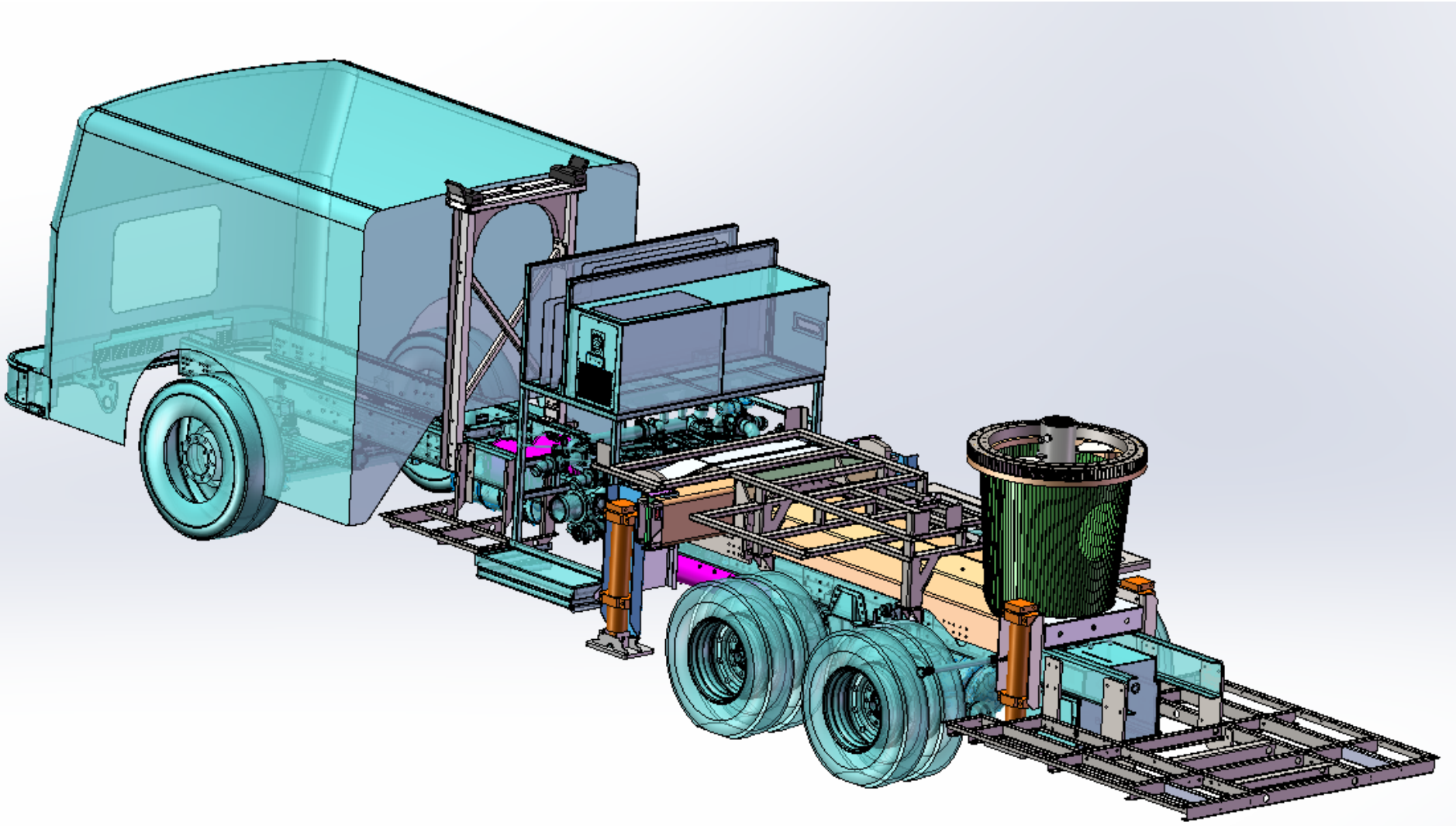
1400’ of 5”
Or
900’ of 5” & 250’ of 2 ½”

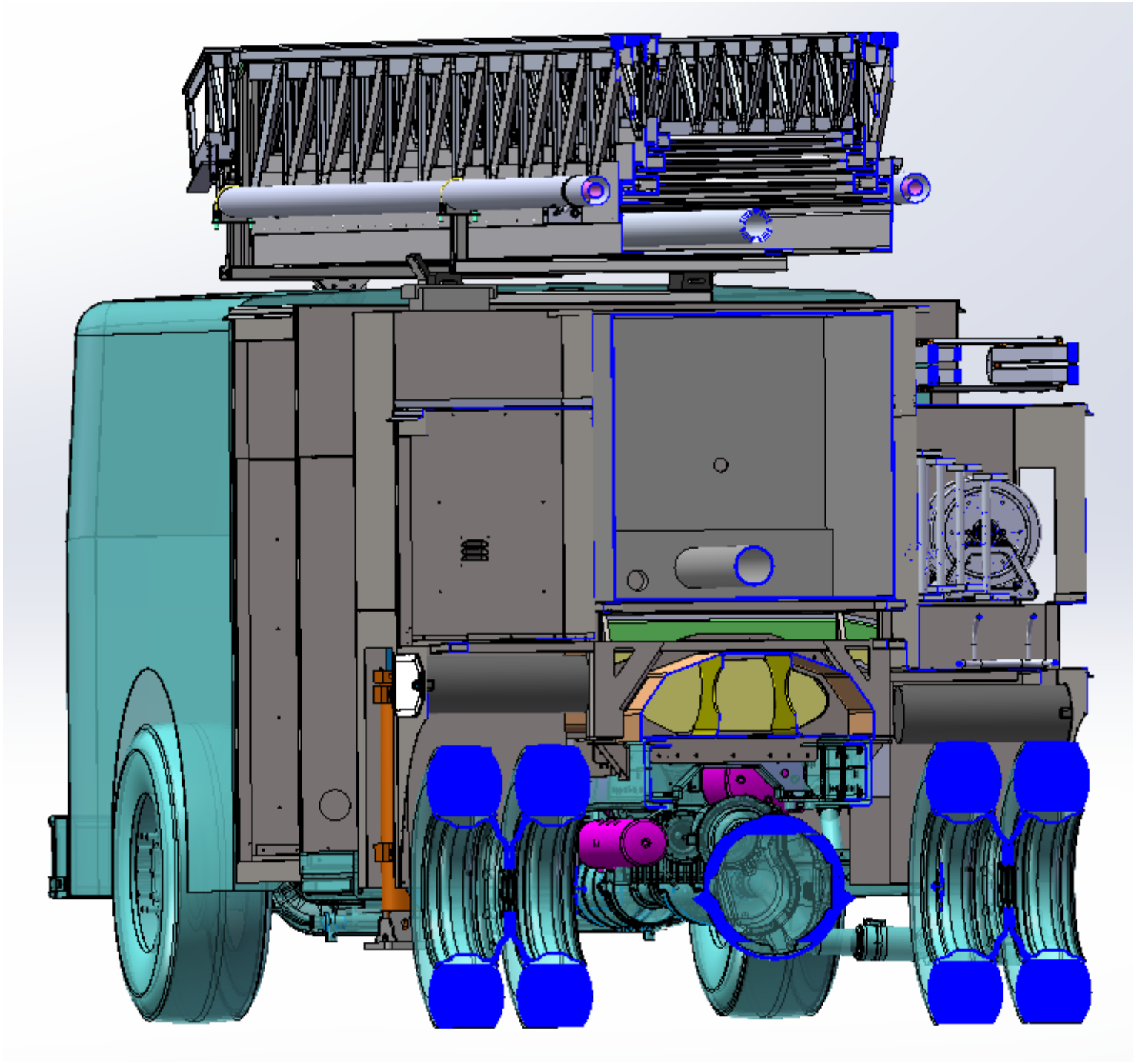
Pike Poles/Fire Hooks

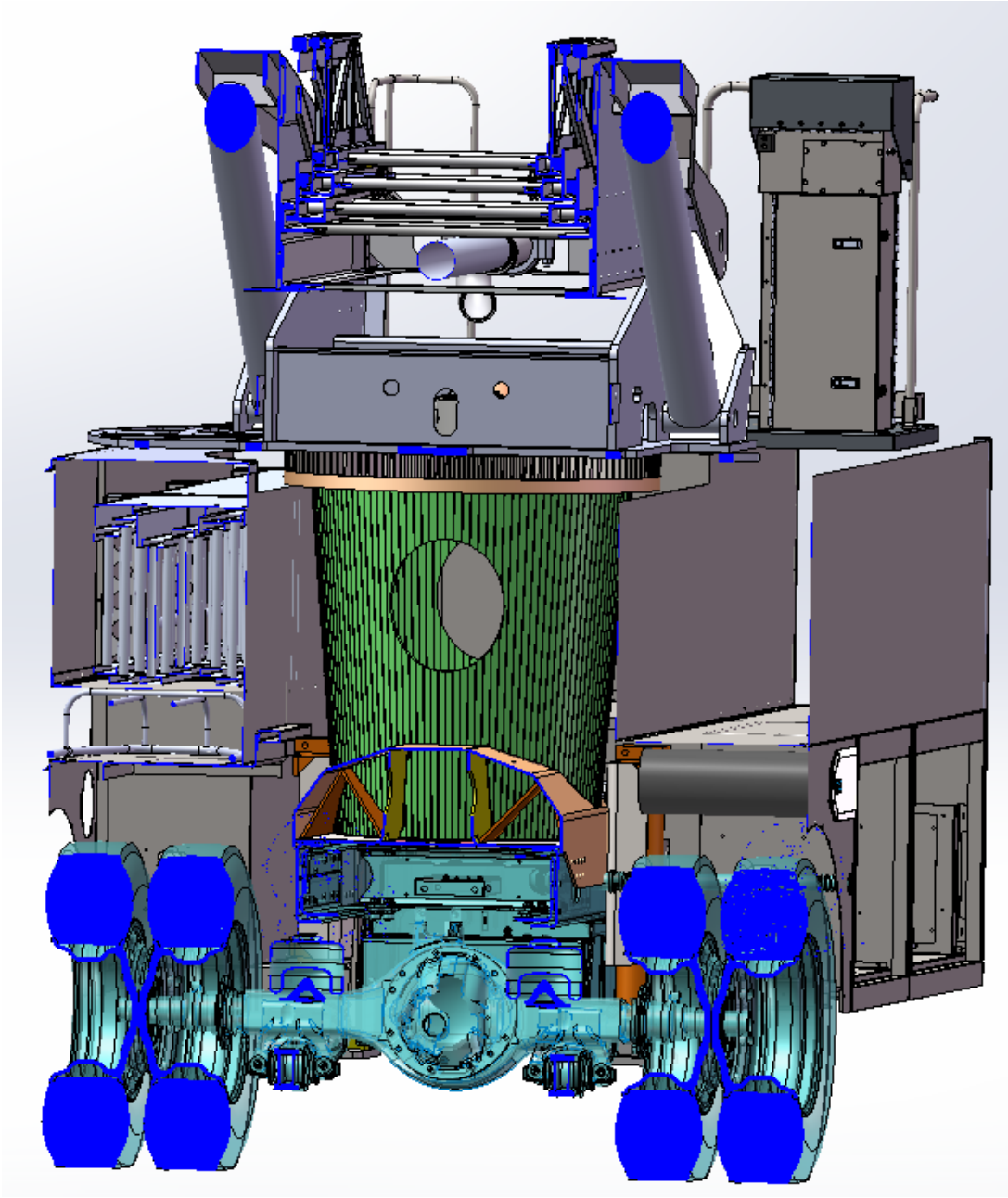


35’ 2-section
(2) 16’ roof
24’ 3-section
14’ combination


75 gallon
Hydraulic tank
500 gallon
Booster tank



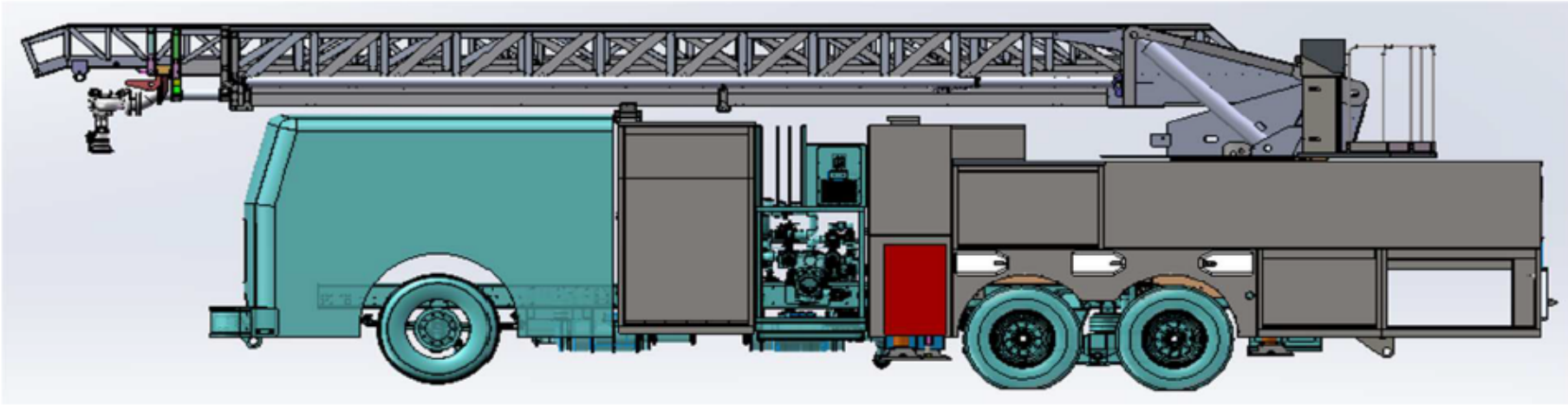


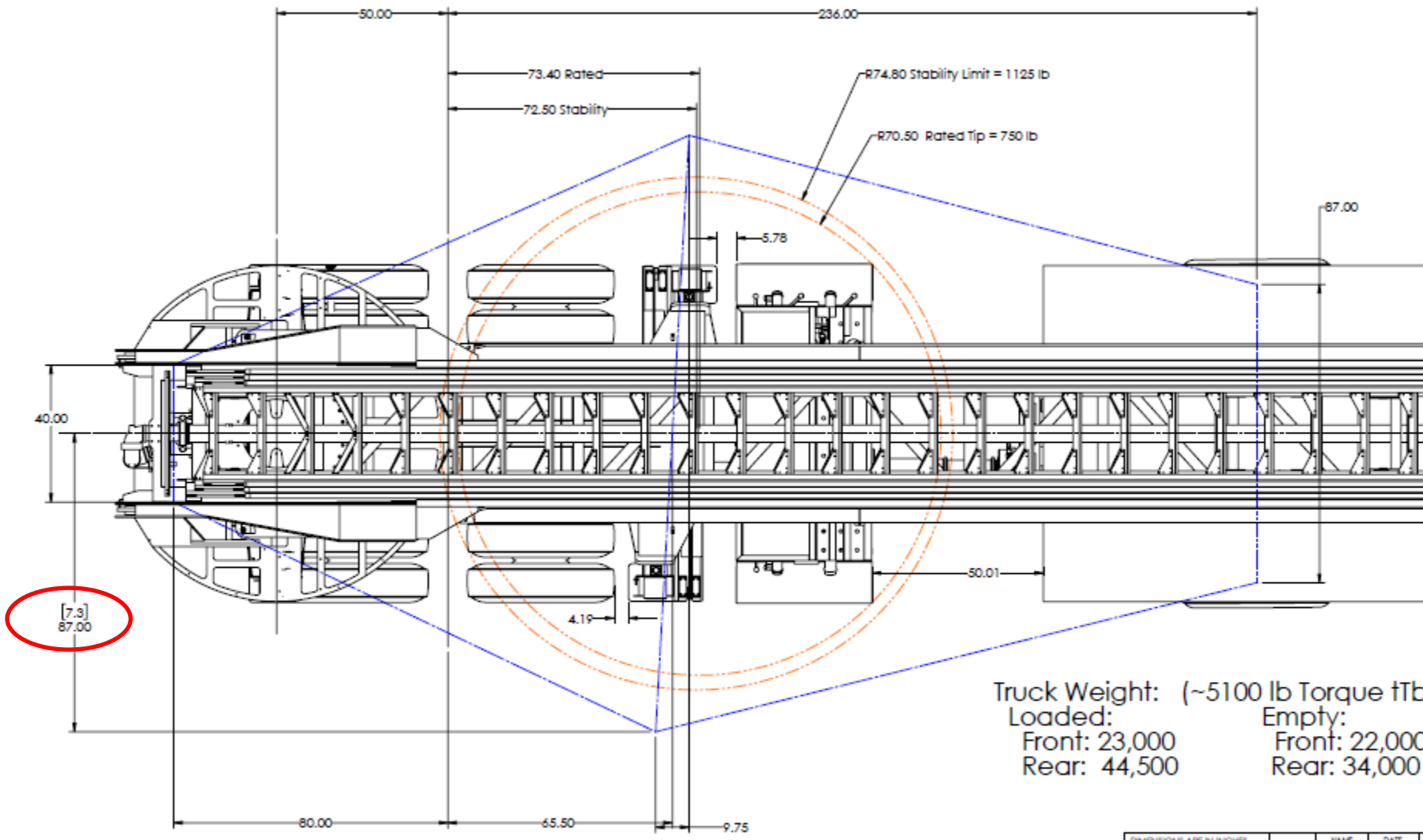


236	Wheelbase (inches)
4000	Equipment Allowance (pounds)
500	Water Capacity (gallons)
23000	Front Axle Capacity (pounds)
46000	Rear Axle Capacity (pounds)

ISX 500 hp engine			ISL 450 hp engine	
Loaded	Unloaded*		Loaded	Unloaded*
23572.44	21842.87	Front	21784.59	19798.94
42677.03	32794.60	Rear	43114.88	34838.53
66249.47	54637.47	Total	64899.47	54637.47

* (including ground ladders, no water, no hose, no personnel, no equipment)





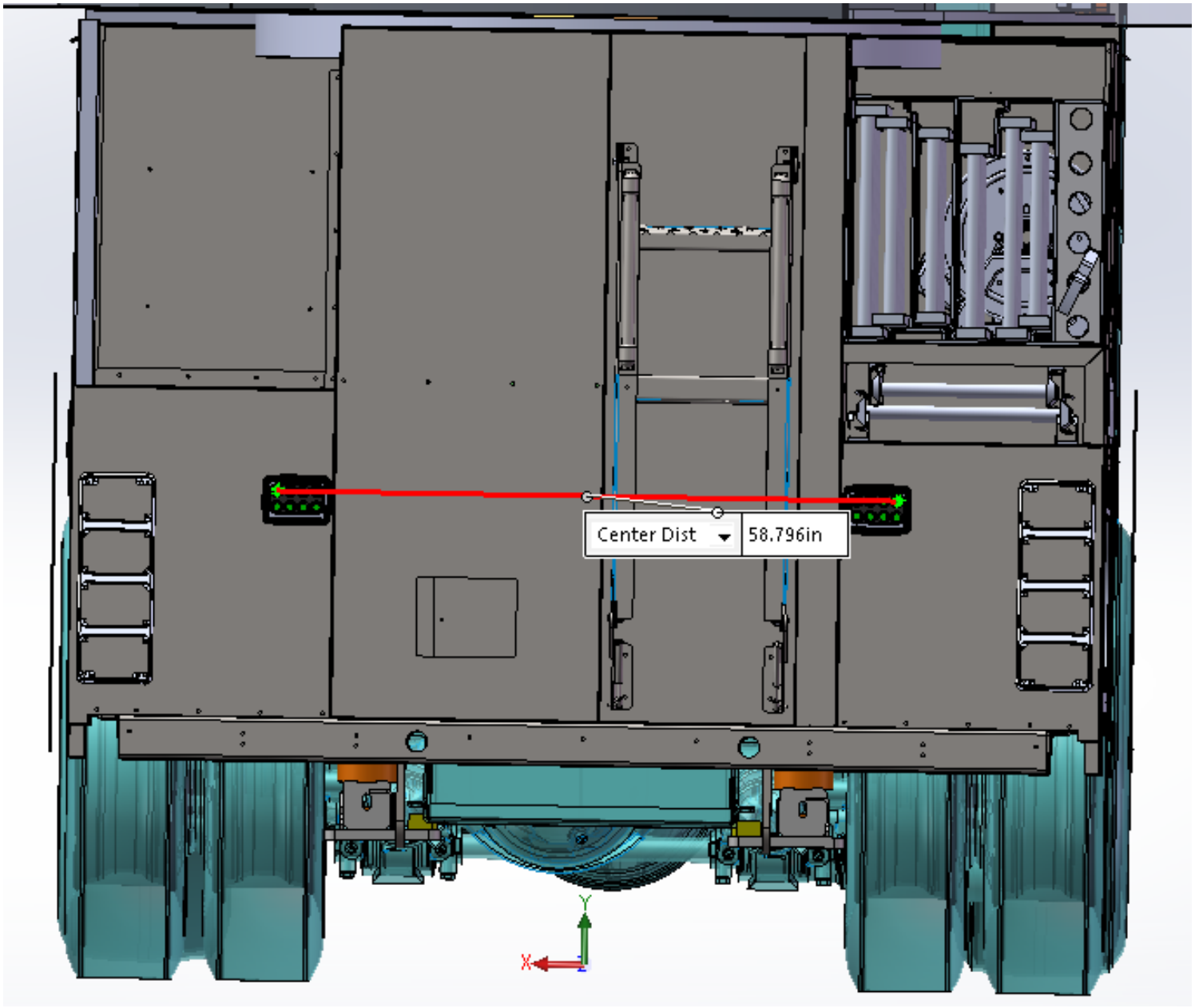
Truck Weight: (~5100 lb Torque tTb

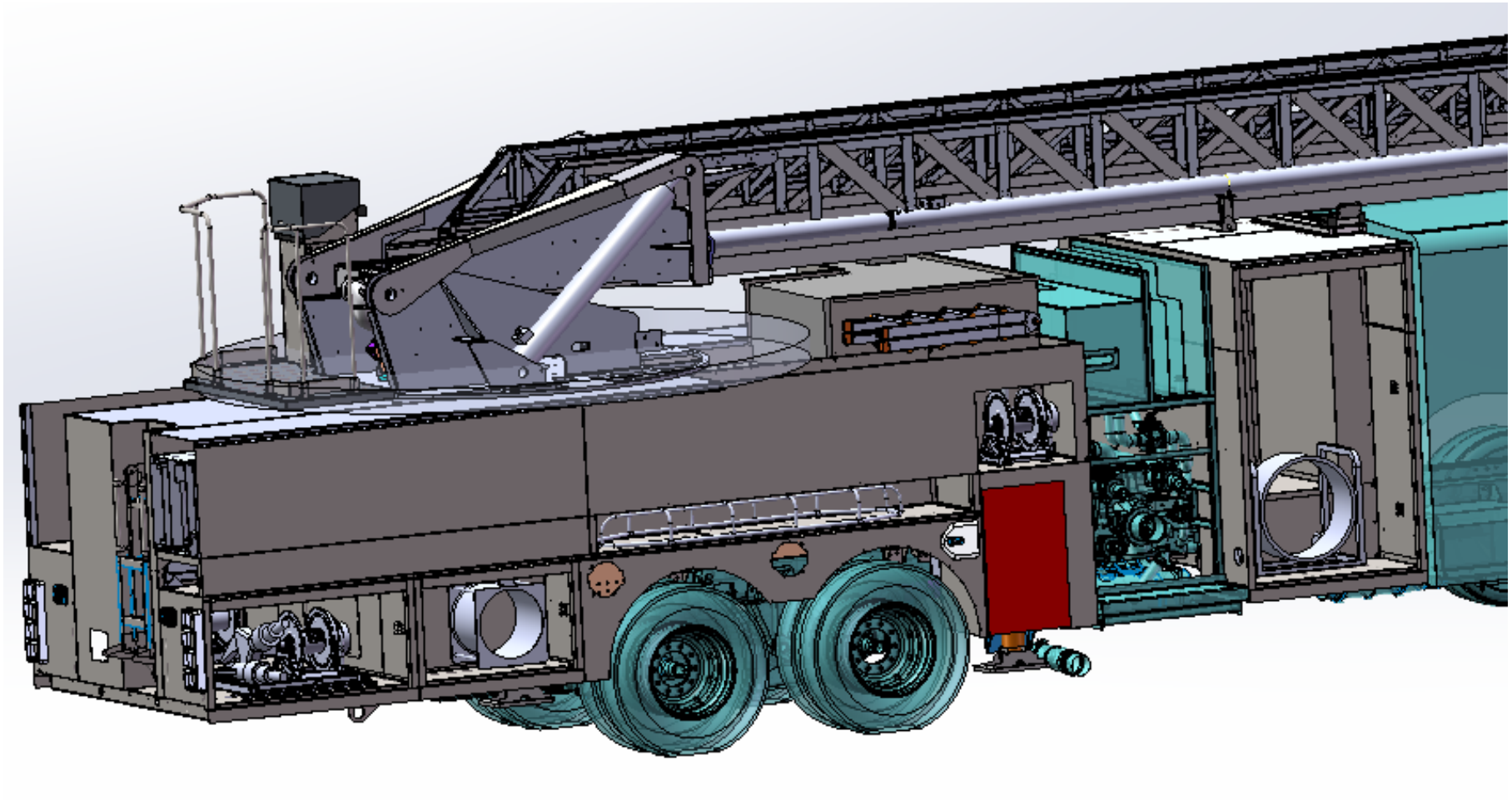
Loaded:	Empty:
Front: 23,000	Front: 22,000
Rear: 44,500	Rear: 34,000

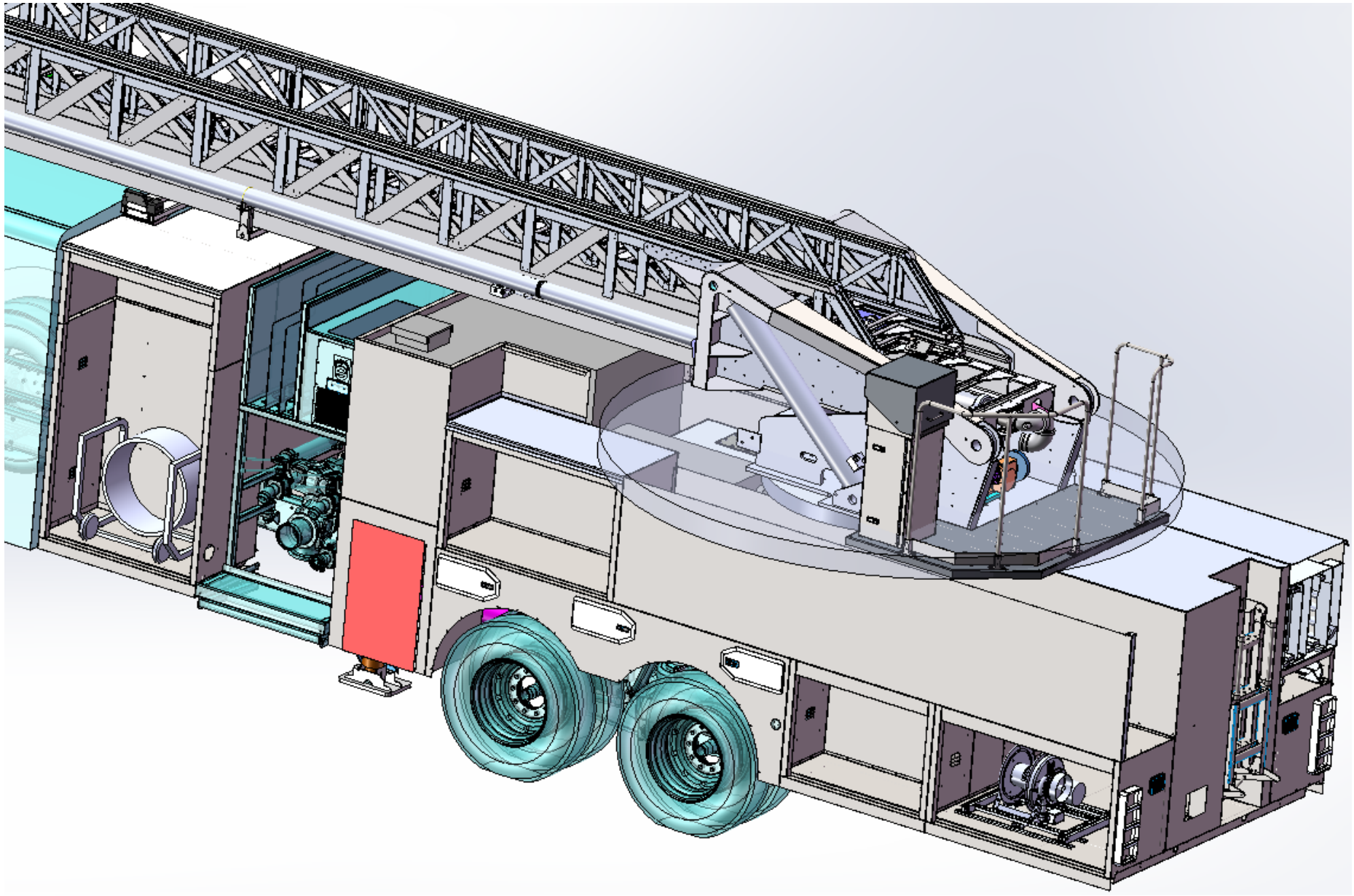
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/16
ANGULAR: ± 0.5°
.X ± 0.06
.XX ± 0.01
.XXX ± 0.005
MATERIAL
FINISH
DO NOT SCALE DRAWING

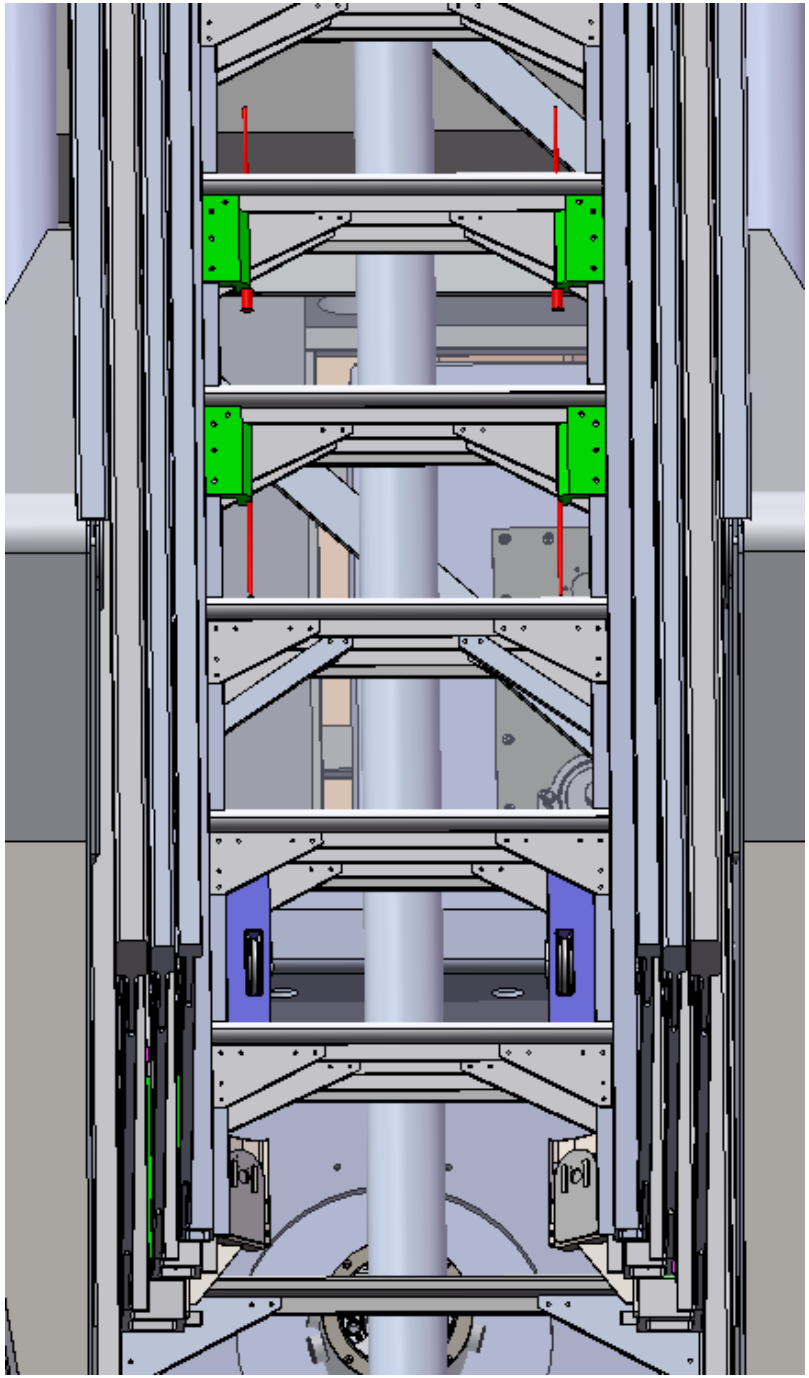
	NAME	DATE
DRAWN		
CHECKED		
ENG APPR.		

COMMENTS:


Center Dist
58.796in
Y
X







4th Section Extension Cables: 8mm Dynaflex

Sheaves vertical

3rd Section Extension Cables: 3/8” Apex

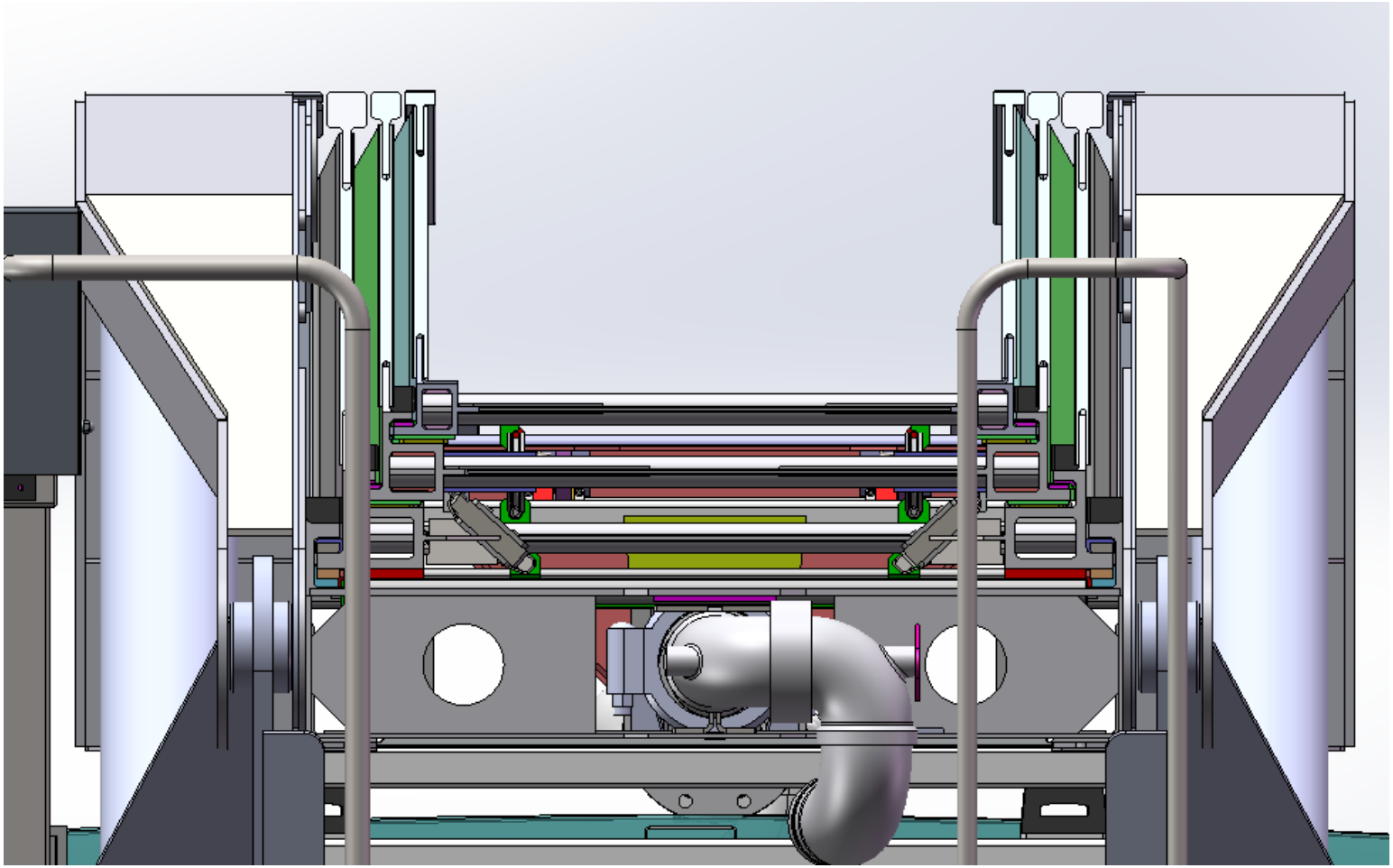
Sheaves angled

Fourth Section: 27.5”w x 15.6”h

Third Section: 30.8”w x 18.7”h

Second Section: 34.25”w x 21.9”h

First Section: 38.6”w x 24.6”h



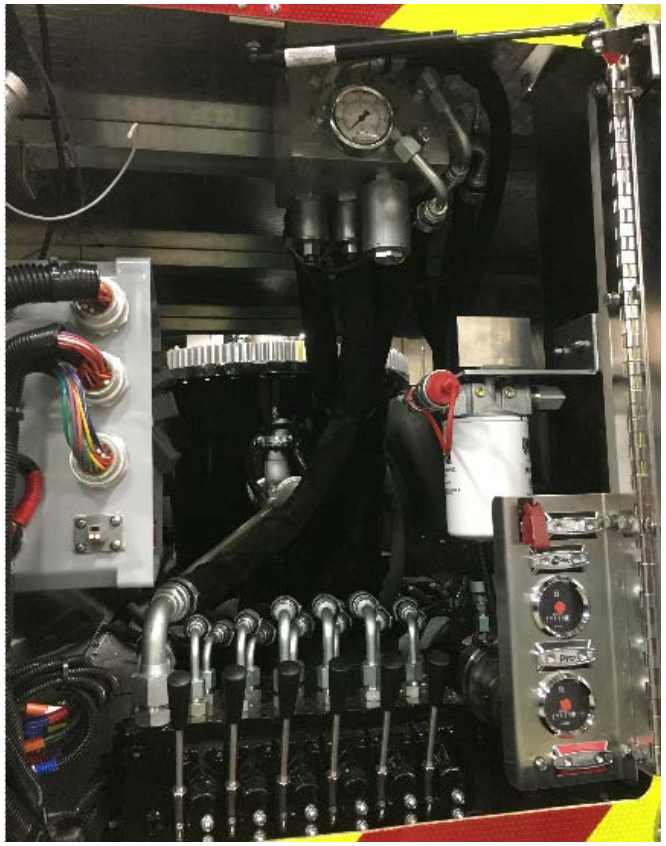
Finished Chassis

Pump Module

Rear Body Support Frame

Front Body Support Drops

Rear of Body

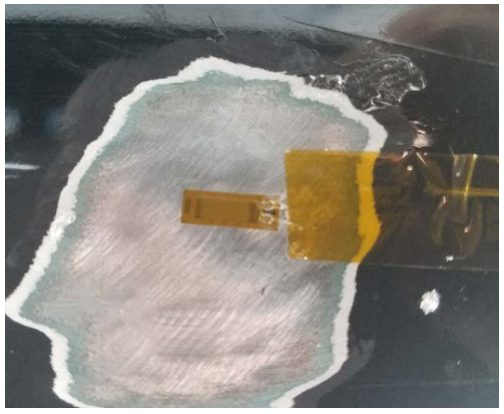


A1
“Hydraulic
Compartment


SUTPHEN
SLR


SUTPHEN
SLR


SUTPHEN



Strain Gauge Tests

5° Slope Test

1.5 x Rated Load Overturning Test

Aerial Waterway Flow Test

Goal set at
1500 gpm
at
Full Elevation
Full Extension

1136 gpm, with 3” valve, 20’ of supply line

We have not tested with the rear inlet, nor 4” discharge valve


Class 1
TPG
IDLE
PRESET
INC
MODE
DEC
MENU/ SILENCE
PSI
RPM
182 PSI
100%
1136 GPM
AKRON
WATERWAY
200 PSI MAX
2-1/2" CROSSLAY
VAC
TEST PORTS
PRES
LOW VOLTAGE ALARM

Pro's

1. Compartment Volume – early feedback tells us that the tall compartments are too tall/inaccessible.
   a. Transverse Compartment
   b. 8 air bottles
   c. Fans, Stokes, Rescue Tools, etc…
2. Water Capacity (500 gallons)
3. Hose Capacity (up to 1400' of 5" or 900' of 5" & 250' of 2 ½")
4. ~~Narrow Jack Span (under 16')~~
5. 4000 pounds of equipment
6. Same pump module as SLR75

Concerns

1. Weight distribution
   a. Will ISX require 25.5k front axle?
   b. Thin margin with ISL
2. Access to turntable? Need feedback.
3. Cost to build – always working on this
4. Travel Height ~ 12'
5. Aerial Waterway Flow – tested at East
6. Tank Flow – 500 gallons
7. Vehicle in service weight - ???
8. Stability at rated load – wide stance down jacks at rear

Solutions

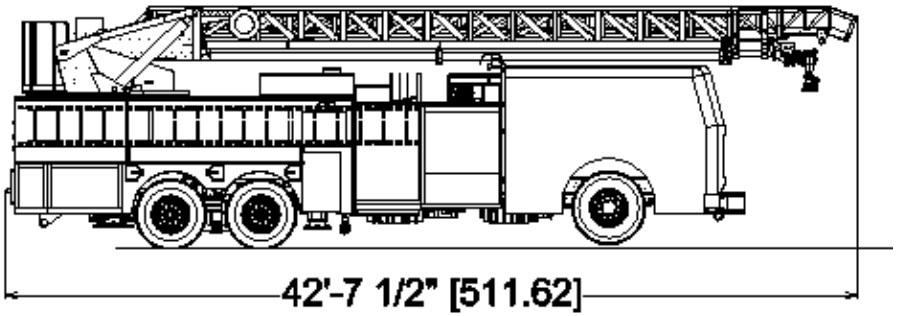
1. Redesign aerial to reduce weight
2. Move rear jacks toward outside and rear of body

More Drastic Changes

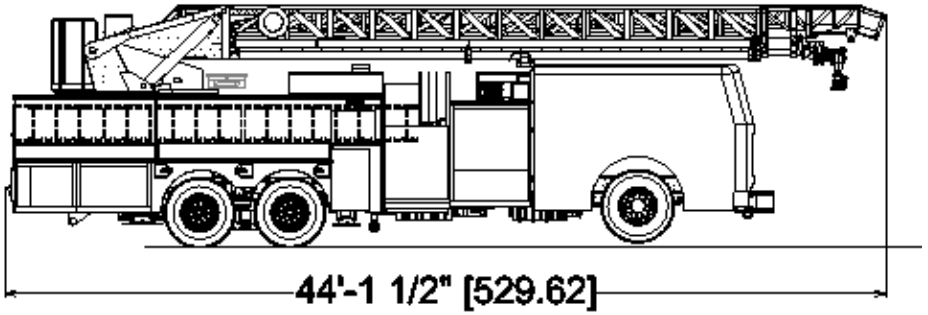
1. Torque tube redesign to allow ground ladders to be stowed on beam

Body Length Options

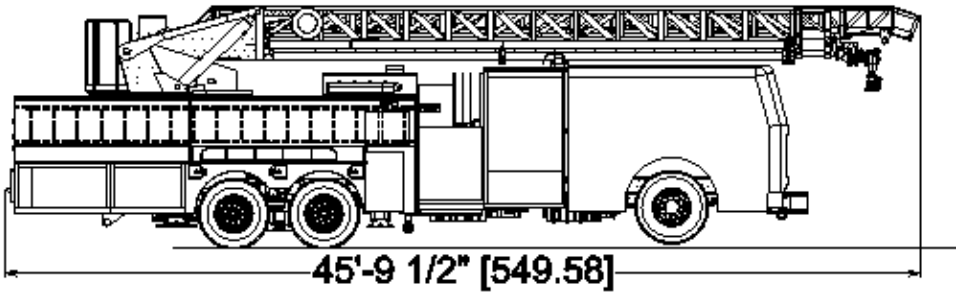
Short
Ground ladders full width of pump module. Limiting crosslays.

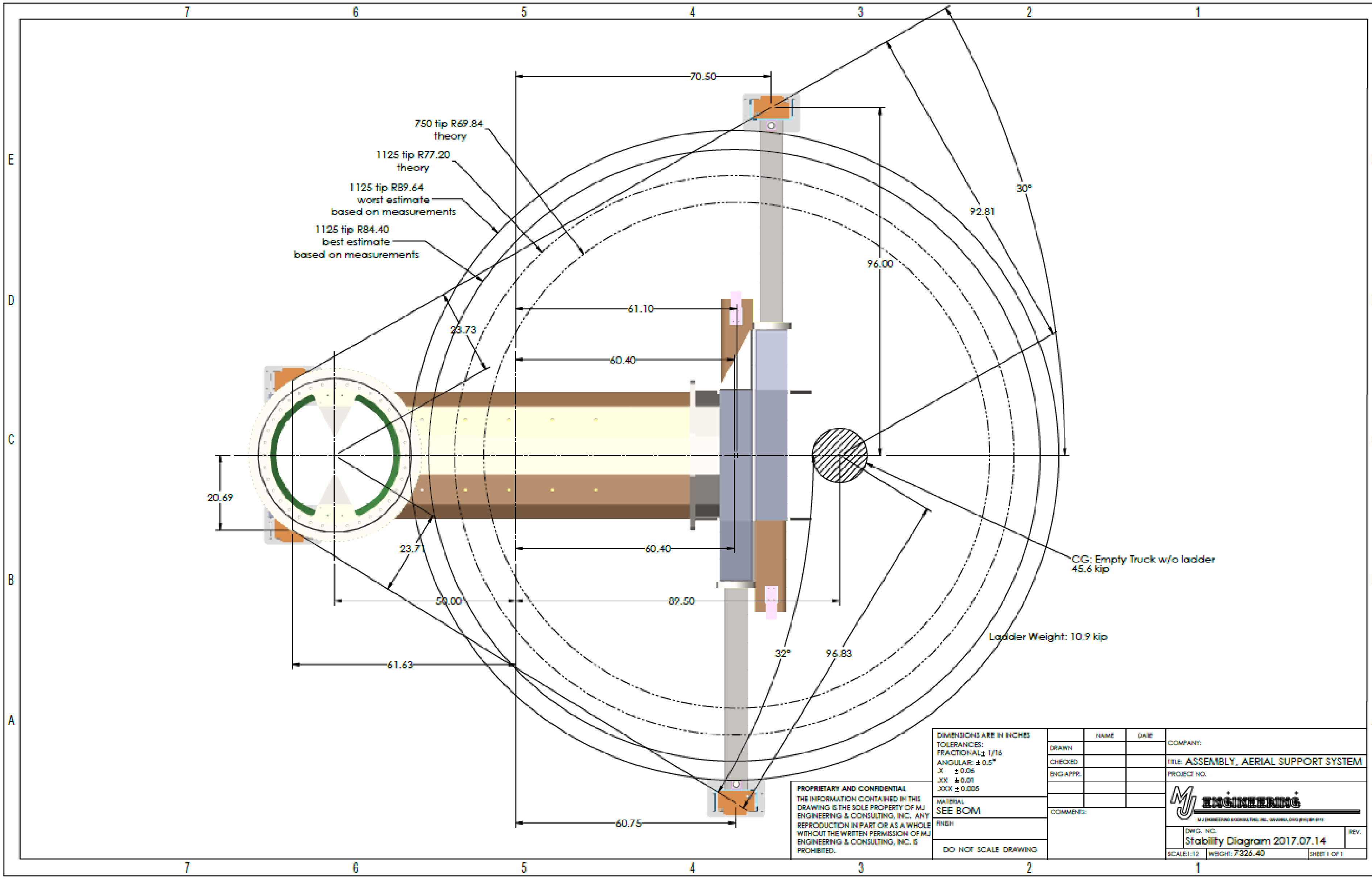


Medium
Ground ladders half width of pump module. Allowing full crosslays.



Long
Ground ladders behind pump module. Allowing full crosslays and more plumbing options.





70.50
750 tip R69.84
theory
1125 tip R77.20
theory
1125 tip R89.64
worst estimate
based on measurements
1125 tip R84.40
best estimate
based on measurements
30°
92.81
96.00
61.10
60.40
23.73
20.69
23.71
60.40
CG: Empty Truck w/o ladder
45.6 kip
50.00
89.50
Ladder Weight: 10.9 kip
61.63
32°
96.83
60.75
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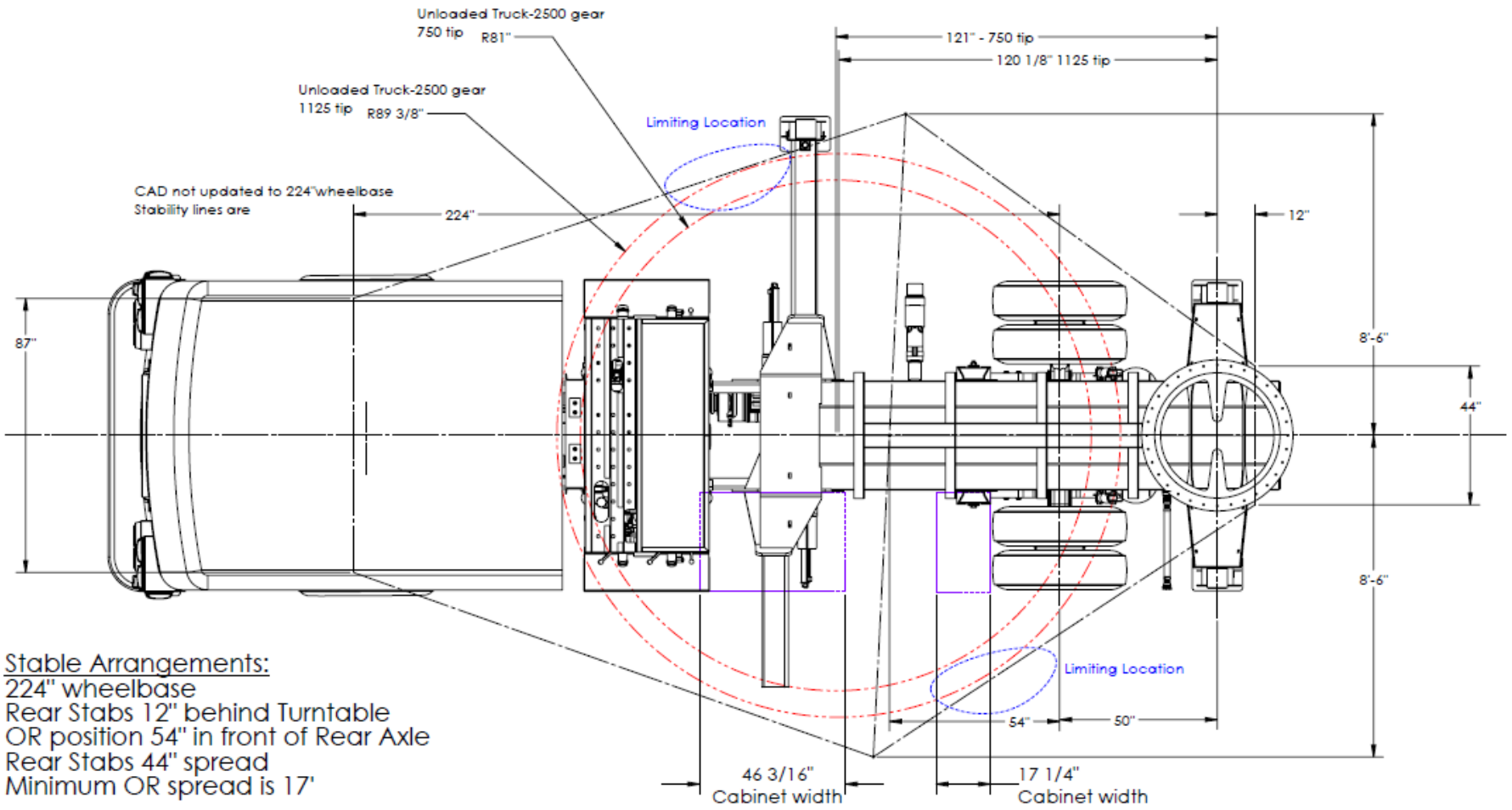
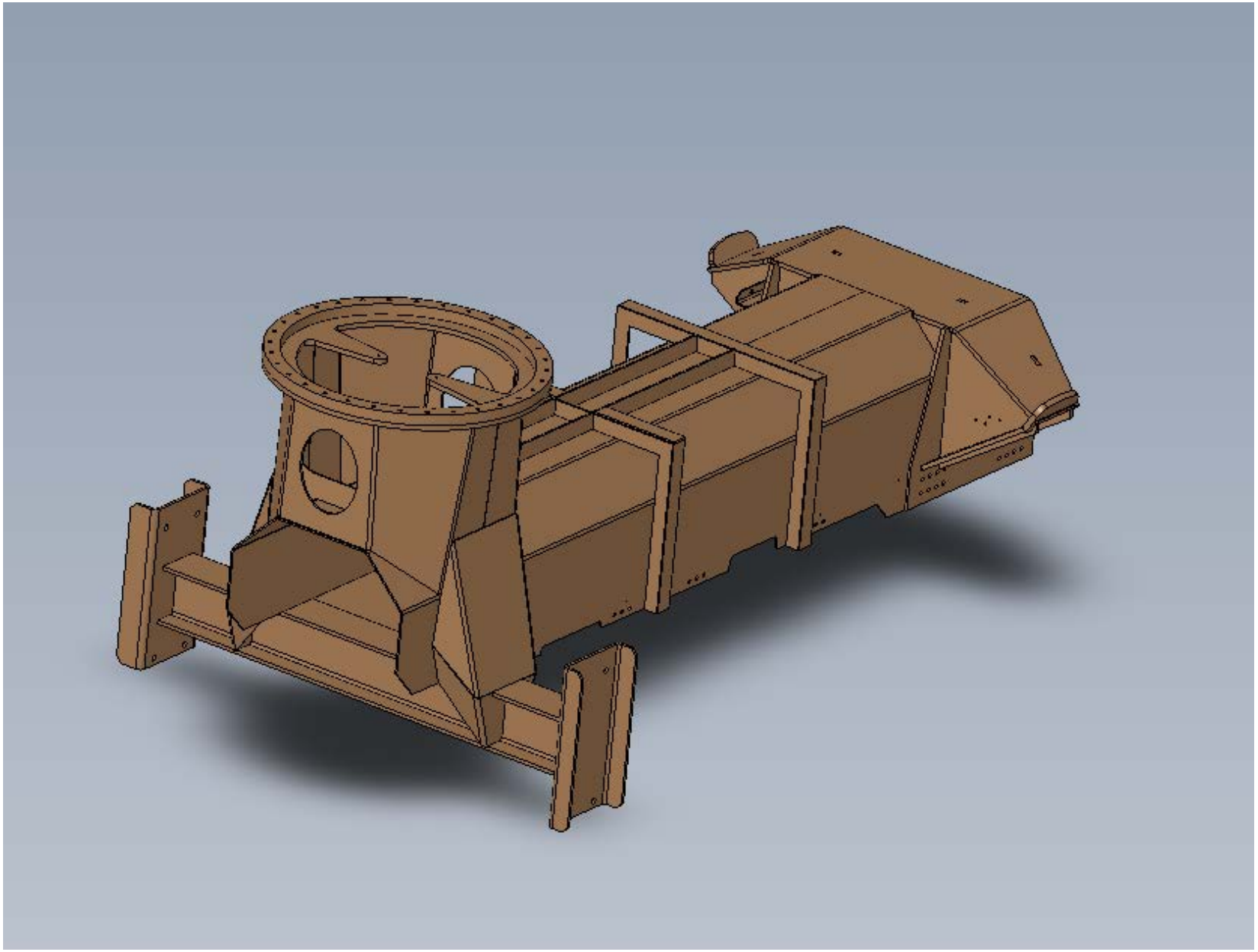
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/16
ANGULAR: ± 0.5°
.X ± 0.06
.XX ± 0.01
.XXX ± 0.005
MATERIAL
SEE BOM
FINISH
DO NOT SCALE DRAWING
NAME
DATE
DRAWN
CHECKED
ENG APPR.
COMMENTS:
COMPANY:
TITLE: ASSEMBLY, AERIAL SUPPORT SYSTEM
PROJECT NO.
MJ ENGINEERING
DWG. NO.
Stability Diagram 2017.07.14
REV.
SCALE:1:12
WEIGHT: 7326.40
SHEET 1 OF 1



Stable Arrangements:
224" wheelbase
Rear Stabs 12" behind Turntable
OR position 54" in front of Rear Axle
Rear Stabs 44" spread
Minimum OR spread is 17'



SUTPHEN

Beyond!

Thank You!