Monorail System
Step 1: Determining Your Total Load

In order to design your system the first thing that must be done is to determine the load that you will be lifting. This load (expressed in pounds) will be referred to as \( P \).

*This load should be the maximum weight of any and all objects you intend to lift with this system, including any slings, spreader bars, grabs, load tables, or other devices used to help lift the objects off the ground.*

Step 2: Determining Your Length Of Lift

Next you will need to find the length of the lift that will be required. The way to do this is the measure from the bottom of where the monorail is to be mounted, down to the floor. Or down to the bottom of the pit, if this system is to lift its load out of a pit or opening in the floor. From this dimension you can subtract the height of the object that you are going to be lifting. This will leave you with the maximum life length you will need, this will be referred to as \( L \).

Step 3: Selecting The Appropriate Hoist

The next thing to do is to select the correct hoist for your application. Determining the correct hoist will depend on a number of factors, these include: the weight of your load \((P)\), the length of the lift required \((L)\), the speed(s) required of the hoist, whether a chain or wire rope is desired, and the method used to power the hoist (manual, electric, hydraulic, air).
Step 4: Selecting The Correct Trolley

What type of trolley you will need for your system? There are three main types of trolleys to chose from, a standard push trolley, and hand geared trolley (uses a gear and chain to move the trolley), and a motorized trolley. There are obviously benefits to each, but the choice is really based on your application.
One important thing to remember is that you cannot have a motorized trolley if you are planning on having any switches in your system. If switches are required and you still want motorized movement, you will have to use a tractor to pull the trolley, see step 9.

Step 5: Determining Hanger Spacing and Track Selection

Next you need to determine how often you can place hangers for the monorail track. This will depend on how the building you are installing this system in is designed. The more frequently you can place the hangers, the greater the load you can support on a smaller and less expensive track.

Here are links to the load charts for the various rail choices we offer, they go in order from lightest rail to heaviest to help you find the best option for you.

Hanger Spacing Tables
Step 6: Calculating Hanger Rod Lengths

In order to calculate the length of your hanger rods there is only one piece of information you need to have, that is the height of any overhead obstructions that are going to be in the way of the monorail that must be accounted for in the design. Once you know this you know how far down the track needs to be dropped, and this is your hanger rod length.
HANGER SUSPENSION BOLTS

When ordering specify correct number of bolts for use with manual or electrified track.

METHOD OF DESIGNATING LEFT HAND AND RIGHT HAND SWITCHES AND CURVES

LEFT HAND SWITCH & CURVE

RIGHT HAND SWITCH & CURVE
This step is centered around what you need for your facility. Based on how your facility is laid out, and how you intend to use the system you must decided where the hoist must be able to travel in order to service your needs.

Any place that you need to have the trolley turn from one section of track on to another section you will need a switch, the switch must be placed 4 feet before the section of track you are turning onto in order to complete the switch. Also when planning any curves or turns in the track, plan on starting the curve 4 feet before you want to finish it.

**Step 8: Electrification (optional)**

If you have either a motorized trolley or hoist or both, you need to also have a method of electrification in order to supply power to these items. There are two main options when it comes to electrification, there is a KANT-SHOCK conductor bar system, or a Festoon system. The advantage to the Festoon system is that it eliminates mobile collectors which will prevent sparks, small electrical arcs, and loss of energy. Festoons however are not good for systems where there will be multiple trolleys or if the extra storage space that is required by the festooning trolleys (about 5% of the total length of the system) is not available. The advantages of the conductor bar system is that it can handle multiple trolley/hoist setups at the same time, can handle a higher ampacity allowing for larger and more power drawing items, and it requires no extra length. Both systems can been seen at this page Conductor Bar

**Conductor Bar**

**Shielded Electrification for Cranes and Monorails**

**KANT-SHOCK™**

Safety type shielded electrification for crane and monorail systems.
Main Features:

- Complete protection against accidental contact
- Complies with I.E.C. Finger Test Safety Standards
- Trouble free operation, minimal maintenance
- Economical installation and operation
- Ideal for both indoor and outdoor applications
- Proven reliability
- Two capacities available with 80 amp range designed for curves, switches, crossover tracks and discontinuous control circuits.

Isometric view of Kant-Shock showing how the PVC completely encloses the conductor bar except for the narrow slot provided for the conductor shoe.

Top: Cannot make contact
Bottom: Finger will not enter
End Caps
To protect the ends of Kant-Shock Electrification from possible contact, heavy neoprene caps are snapped securely over the shielding at each end of the system. End stops on monorail track should be located so that the collectors do not hit the caps.

Expansion Joint
Used at building expansion joints and at 300 ft. intervals of each conductor run for normal installations. The expansion joint allows for expansion and contraction, keeps the separated conductor bars in alignment, and guides the collector shoe across the gap. A length of high tension insulated cable attached to the end of each conductor bar forming the expansion joint, bridges the gap electrically. The cable is connected to the standard feed in clamp screws and fully shrouded by a polyvinyl snap on cover. Should a gap be installed at the centre of a run, power-feeds may be attached directly to these bridging wires. Maximum permissible gap at any one joint is 1”. Should more expansion than this be desirable in the scheme further joints must be installed in the system.
**Insulating Section**
For automatic dispatch control or other locations where conductor bars must be isolated, an insulating section of dielectric material is furnished to fit securely inside the Kant-Shock Shielding and match the adjoining conductor bars. These insulating sections can be located at any desired point in the system.

**Collectors** have a self cleaning sliding shoe collector, set in a moulded plastic insulator, which fits on an articulated trolley arm. The trolley arm is spring loaded to keep the collector in correct alignment with the conductor at all times.

**Power Feeds**
Power can be fed to Kant-Shock Electrification at any point, preferably at a splice. The feed wire is secured to the back of the Splice Clip by simply placing the cable tag under one of the splice nuts. A Kant-Shock splice cover with one end plug removed is then
snapped on to provide complete insulation.

The higher rated requirements are adequately covered by the 200 amp range of the Kant-Shock shielded electrification system. The system is mechanically stronger and more rigid than others of similar electrical capacity utilizing copper or similar materials for the conductor.

**Festoon Systems for Platform & Round Cables**

![Festoon Systems](image)

**Advantages:**

- Elimination of mobile collectors which prevents sparks, small electrical arcs, loss of energy and dropping of tension when the current passes from one element to another, trolleys, etc.
- Perfect insulation
- Easy, rapid mounting, maintenance free
Proper Spacing of Hangers in Standard MonoRail

Location and spacing of suspension points for supporting MonoRail track and switches should be given every possible consideration in order to attain the greatest degree of safety together with a perfectly horizontal runway eliminating irregular grade effects caused by slight deflections in the rail. Adherence to spacing given in the table below as well as the suggested location of hangers indicated in the diagram at the top of this page will assure permanent support for the loads to be carried. Spacings have been accurately determined so that in no case will deflection in the rail between hangers exceed 1/250th of the span nor will the load on any one bolt exceed 2500 pounds.

Note that the data given includes spacings for systems where one, two, three, four or more trolleys may be used. Where conditions make possible the concentration of two or more trolleys such loading must be considered and the proper hanger spacing provided.

In planning a system it will be advantageous to provide for any possible future increase in load conditions and provide support for such loads at the time of original installation.

### TABLE OF HANGER SPACING FOR STANDARD MONORAIL

<table>
<thead>
<tr>
<th>Trolley Loads</th>
<th>Catalog Number of Trolley</th>
<th>One Trolley Only</th>
<th>Two Trolleys</th>
<th>Three Trolleys</th>
<th>Four or More Trolleys</th>
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### Crane Number

<table>
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<tr>
<th>Crane</th>
<th>Total Load on Crane Trolley Including Crank Weight</th>
<th>Max. Hanger Spacing</th>
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<tr>
<td>#E506 &amp; #E599</td>
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<td></td>
</tr>
<tr>
<td>950 s</td>
<td>2200 s</td>
<td>7' 9&quot;</td>
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<tr>
<td>1200 s</td>
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<tr>
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<td>4' 0&quot;</td>
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<tr>
<td>3000 s</td>
<td>8000 s</td>
<td>3' 6&quot;</td>
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### For Crane Runways Assuming One Crane Per Runway

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<td>#E2242, #E2243</td>
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<tr>
<td>All Loadings</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>3' 0&quot;</td>
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</table>
**Step 9: Selecting A Monotractor (optional)**

If your system requires motorized trolley movement, but also requires that you have track switches, then a **monotractor** is your solution. A **monotractor** will run in front of your hoist and trolley, and will be connected to that trolley by a load bar. The **monotractor** uses a rubber drive wheel to pull itself, and your load along the track, its special design allows it to negotiate the tight curves of monorail curves and switches.

Based on how your facility is laid out, and how you intend to use the system, it must be decided where the hoist travel will best serve the needs of your facility.
Any place that you need to have the trolley turn from one section of track on to another section you will need a switch, the switch must be placed 4 feet before the section of track you are turning onto in order to complete the switch. Also when planning any curves or turns in the track, plan on starting the curve 4 feet before you want to finish it.
Electric Wire Rope Hoists

Heavy Duty Built Up Trolley Hoist

Double Girder Top Running Design
5-Ton thru 75-Ton Capacity
Reliable Type "RS" Hoist Trolleys

STANDARD SPECIFICATIONS

- Horizontally Split Gear Case Design
- Five (5) Step Variable Speed Hoist Control
- Mechanical Load Brake
- Electric Hoist Motor Brake 150% Torque Rated
- Geared Upper and Lower Limit Switch
- Weight Operated Upper Limit Switch
- One Piece Steel Weldment Trolley Frame
- Five (5) Step Variable Speed Trolley Control
- Electric Trolley Motor Brake 100% Torque Rated
- Precision 4140 Alloy Steel Trolley Wheels
- True Plumb Hook Lift Reeling
- Enclosed Lower Hook Block With Safety Latch

OPTIONAL EQUIPMENT

- Eddy Current Lowering Controls
- AC Static Stepless Control
- Power Circuit Upper Limit Switch
- D.C. Motors and Controls
- Dynamic Lowering Controls
- Spring or Hydraulic Trolley
- Auxiliary Hoists
- Special Girder Gages Available
- Bumpers
- Motorized Rotated Hook
- Special Lifts & Speeds Available

Production Modular Design Trolley Hoist

![Production Modular Design Trolley Hoist](image)

Double Girder Top Running Design
5-Ton · 7.5-Ton · 10-Ton Capacity
Single Speed, 2 Speed, 3 or 5 Point Variable Speed

**Reliable Type "RPM" Monorail Hoists**

Lug Suspended Hoists

**Optional Features**

- Higher Capacities Available Upon Request
- Special Voltages
- Flat Tread Wheels
- 2 Speed Hoist
- 2 Speed Trolley

Model SNH
- Special Lifts and Speeds
- Pushbutton Stations
- Overload Limit Switches

**Automated Pit Scale Hoists**

**Trolley Suspended Hoists**

Motor Driven  Hand Push  Low Headroom  
Model SNHE  Model SNHH  Model SNHELW
Single Speed or 2 Speed Hoists

STANDARD FEATURES

- Upper and Lower Limit Switch
- 250% Torque Hoist Motor Brake
- NEMA Rated Contactors
- No Overhung Gears or Pinions
- Low Headroom Construction
- All Gears Operate In Oil Bath
- Helical Gearing For Quiet Operation
- Trolley Drive on Both Sides of Beam
- 100% Trolley Brake
- NEMA 3R/12 Control Enclosure
- 110 Volt Fused Control Circuit
- 230/460-3-60 AC Dual Wound Motors
- TENV Class "F" Insulated Motors
- M.R.O.P. (Motor Running Overcurrent Protection)
- M.O.P. (Motor Overcurrent Protection)
- All Steel Drum with Machined Grooves
- Safety Drop Lugs on Trolley
- Operation on I-Beam or W.F. Beams
Electric Chain Hoists

1. Center Frame
2. Wear-Resistant Durable Load Sheave
3. Heavy Duty Motor
4. Over-Hoist, Over-Lower Protection
5. Forged Steel Hooks
6. Ultra Tough Surface Hardened Load Chain
7. Precision Reduction Gearings
8. Low Voltage Control
9. Push Button Remote Control
10. Efficient Brake
11. Silent Gear Case
Single-speed/Two-speed

Model ECC-3 Single Speed
Single Phase Motor

Model EC-3M Single Speed
Model ECT-3M Two Speed
3 Phase 220/440V
Geared/Plain Trolleys

**Model MHG-5**
Geared Trolley

**Model MHP-5**
Plain Trolley

**Model MHT-5**
Two-speed hoist

**Model EMTT-MHT-5**
Two-speed hoist, two-speed trolley
MANUAL HOISTS

CHAIN HOISTS

- Patented Safety-Hook with Safety-Latch
- Top Hook has Large Throat Opening
- Chain Guides allow chain to move more freely
- Chain Stop prevents jamming at lowest position of hook
LEVER HOISTS

- Retaining plate
- Change lever
- Handle
- Grip ring
- Retaining pawl

Features:
- Triple spur geared for easy operation with short handle.
- Light weight, all steel construction.
- Patented "SURE GRIP" hooks.
- Thumb control up/down with free wheeling grip ring.
- Ratchet and pawl load holding.
- Automatic load brake.

3/4 ton · 1-1/2 ton · 3 ton · 6 ton
PULLER

Features:
- Small, light weight.
- Equipped with two safety devices.
- Fast speed of 10 feet per minute.
- Can be used at any working angle.
- Equipped with a safety hook.
- Rope release handle
- Operating lever
- Rope exit
- Rope entry
- Reversing lever
- Carrying handle w/ 2 sets of spare shear pins
Light, powerful, easy to move, easy to use. Practical, safe, pulling and lifting solutions.

**AIR HOISTS**

Lifting Capacities 1100 LBS. - 2200LBS. (500KG - 1000 KG)

- **EHL-500**
  - Capacity 500 KG
  - 1100 lbs.

- **EHR-1000**
  - Capacity 1000 KG
  - 2200 lbs.

- **PENDANT CONTROL SWITCH**
Link or Roller Chain

Link and roller chain models available. Link chain models equipped with chain buckets.

Pendant Control Switch

Excellent control characteristics, minimal setting force required, designed for one-handed operation. Ergonomic design with standard control hoses (2M length). Longer hoses available.

Safety Hooks

Drop-forged, heat-treated suspension hook and load hook mounted on swivel steel balls with safety latches.

Light Duty Air Hoists

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>lbs.</th>
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<tbody>
<tr>
<td>EHW-120</td>
<td>120 KG</td>
<td>260</td>
</tr>
<tr>
<td>EHW-120R</td>
<td>120 KG</td>
<td>260</td>
</tr>
<tr>
<td>AH-250R</td>
<td>250 KG</td>
<td>550</td>
</tr>
</tbody>
</table>
High Speed
- Safe
Compact
- Quiet
Lightweight
- Easy
Handling

United States Monorail
A Division of American Crane and Hoist Corporation

US - 1L RailMaster Track

US-1L RailMaster Track is a special rail section of carbon-manganese steel rolled to our specifications. The manganese content creates a dense, uniform, fine-textured steel of great tensile strength. This alloy is specially suited to carry rolling wheel loads. It is also much stronger than ordinary steel as a load bearing member.

The section offers economy in carrying loads over long spans with economical hanger spacing. It also permits a flat tread for accurate bearing of trolley wheels to ensure easy movement of carriers.

The combination of carbon and manganese furnishes a uniform rail which will not wear nor roll down in service.
<table>
<thead>
<tr>
<th>RAIL</th>
<th>SPAN IN FEET</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
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<tbody>
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<td></td>
<td>7,290</td>
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</tbody>
</table>

1. The above loads are on beams that are laterally free, and supported at each end.
2. The figures shown above are Live Loads, beam weights deducted.
3. Deflection does not exceed 1/450 of the span.
US - 1H RAILMASTER TRACK

US-1H Railmaster Track is a special rail section of carbon - manganese steel rolled to our specifications. The manganese content creates a dense, uniform, fine-featured steel of great tensile strength. This alloy is specially suited to carry rolling wheel loads.

It is also much stronger than ordinary steel as a load bearing member.

The section offers rigidity for carrying loads over long spans with economical hanger spacing. It also presents a flat tread for accurate bearing of trolley wheels to assure easy movement of carriages.

The combination of carbon and manganese furnishes a uniform rail which will not wear nor roll down in service.
## CONCENTRATED LOADS

### LOAD TABLE FOR US-1H RAILMASTER SECTIONS

<table>
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<tr>
<th>Rail</th>
<th>Length of Capping</th>
<th>Span in Feet</th>
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<th>12</th>
<th>14</th>
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<table>
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<td>16,990</td>
<td>16,220</td>
<td>14,130</td>
<td>12,500</td>
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<td>9,470</td>
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<td>19,560</td>
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<td>14,560</td>
<td>12,880</td>
<td>11,520</td>
<td>10,400</td>
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<td>14,240</td>
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<tr>
<td>US-22A-H</td>
<td>7</td>
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<td>34,110</td>
<td>28,350</td>
<td>24,220</td>
<td>21,110</td>
<td>18,690</td>
<td>16,740</td>
<td>15,140</td>
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<tr>
<td>US-23H</td>
<td>8</td>
<td></td>
<td>23,530</td>
<td>19,530</td>
<td>16,660</td>
<td>14,500</td>
<td>12,810</td>
<td>11,440</td>
<td>10,320</td>
</tr>
</tbody>
</table>

1. The above loads are on beams that are laterally free, and supported at each end.
2. The figures shown above are Live Loads, beam weights deducted.
3. Deflection does not exceed 1/450 of the span.
The general description of Truss and Girder Rail in Catalog E-1 is supplemented on this and the following two pages with load tables and other information of value in making layouts.

Truss and Girder Rails are furnished in straight sections only. Length of sections and width of top flange must be specified when ordering. Outlines to the right show the assemblies available for various track connections. They should be designated by the number given for convenience in specification. When furnished for overlapping splice, sections are measured from center of lap as indicated. Standard and wide flange sizes are interchangeable, the wide flange being stronger and especially adapted to longer spans.

Considerable advantage may be gained by the use of Truss and Girder Rail where the layout will allow continuous beam construction as in crane runways. Lap splices should be located at the center of support points. Since the method of splicing does give a substantial amount of continuous beam action, the lap splices, in certain instances depending on loads and rail spans, may be located off the support points. Check with the home office for further advice when these situations arise.

### Load Table for Standard Truss and Girder Rail

**Simple Beam-Load Concentrated in Center**

Beam Weight Deducted \( f = 20,000 \) P.S.I.

<table>
<thead>
<tr>
<th>No. of Rail</th>
<th>Weight Per Foot</th>
<th>Upper Flange Width</th>
<th>Section Modules</th>
<th>8'</th>
<th>10'</th>
<th>12'</th>
<th>14'</th>
<th>16'</th>
<th>18'</th>
<th>20'</th>
<th>22'</th>
<th>24'</th>
<th>26'</th>
<th>28'</th>
<th>30'</th>
<th>32'</th>
<th>34'</th>
<th>36'</th>
<th>38'</th>
<th>40'</th>
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</thead>
<tbody>
<tr>
<td>434</td>
<td>12.7</td>
<td>4</td>
<td>SC = 8.84</td>
<td>5130</td>
<td>5990</td>
<td>6980</td>
<td>7990</td>
<td>8990</td>
<td>9990</td>
<td>10990</td>
<td>11990</td>
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<td>15990</td>
<td>16990</td>
<td>17990</td>
<td>18990</td>
<td>19990</td>
<td>20990</td>
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<tr>
<td>434</td>
<td>12.5</td>
<td>5</td>
<td>SC = 10.01</td>
<td>5280</td>
<td>6130</td>
<td>7080</td>
<td>8030</td>
<td>8980</td>
<td>9930</td>
<td>10930</td>
<td>11930</td>
<td>12930</td>
<td>13930</td>
<td>14930</td>
<td>15930</td>
<td>16930</td>
<td>17930</td>
<td>18930</td>
<td>19930</td>
<td>20930</td>
</tr>
<tr>
<td>431</td>
<td>14.9</td>
<td>5</td>
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<td>6720</td>
<td>7670</td>
<td>8620</td>
<td>9570</td>
<td>10570</td>
<td>11570</td>
<td>12570</td>
<td>13570</td>
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<td>15570</td>
<td>16570</td>
<td>17570</td>
<td>18570</td>
<td>19570</td>
<td>20570</td>
<td>21570</td>
</tr>
<tr>
<td>431</td>
<td>16.7</td>
<td>6.19</td>
<td>SC = 12.65</td>
<td>6970</td>
<td>8000</td>
<td>8930</td>
<td>9930</td>
<td>10930</td>
<td>11930</td>
<td>12930</td>
<td>13930</td>
<td>14930</td>
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<td>17930</td>
<td>18930</td>
<td>19930</td>
<td>20930</td>
<td>21930</td>
<td>22930</td>
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<tr>
<td>431</td>
<td>18.0</td>
<td>6.19</td>
<td>SC = 17.71</td>
<td>8350</td>
<td>9700</td>
<td>11050</td>
<td>12400</td>
<td>13750</td>
<td>15100</td>
<td>16450</td>
<td>17800</td>
<td>19150</td>
<td>20400</td>
<td>21750</td>
<td>23000</td>
<td>24350</td>
<td>25700</td>
<td>27050</td>
<td>28400</td>
<td>29750</td>
</tr>
<tr>
<td>431</td>
<td>20.0</td>
<td>7.19</td>
<td>SC = 22.6</td>
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<td>15000</td>
<td>16500</td>
<td>18000</td>
<td>19500</td>
<td>21000</td>
<td>22500</td>
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<td>27000</td>
<td>28500</td>
<td>30000</td>
<td>31500</td>
<td>33000</td>
<td>34500</td>
</tr>
<tr>
<td>424</td>
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<td>3440</td>
<td>3640</td>
<td>3840</td>
<td>4040</td>
<td>4240</td>
<td>4440</td>
<td>4640</td>
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<td>5040</td>
<td>5240</td>
<td>5440</td>
<td>5640</td>
<td>5840</td>
<td>6040</td>
</tr>
<tr>
<td>424</td>
<td>24.5</td>
<td>8.19</td>
<td>SC = 37.4</td>
<td>4359</td>
<td>4599</td>
<td>4839</td>
<td>5079</td>
<td>5319</td>
<td>5559</td>
<td>5799</td>
<td>6039</td>
<td>6279</td>
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<td>6999</td>
<td>7239</td>
<td>7479</td>
<td>7719</td>
<td>7959</td>
<td>8199</td>
</tr>
<tr>
<td>431</td>
<td>27.1</td>
<td>8.19</td>
<td>SC = 43.0</td>
<td>8205</td>
<td>8405</td>
<td>8605</td>
<td>8805</td>
<td>9005</td>
<td>9205</td>
<td>9405</td>
<td>9605</td>
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<td>10405</td>
<td>10605</td>
<td>10805</td>
<td>11005</td>
<td>11205</td>
<td>11405</td>
</tr>
<tr>
<td>431</td>
<td>29.1</td>
<td>10.19</td>
<td>SC = 48.5</td>
<td>11205</td>
<td>11405</td>
<td>11605</td>
<td>11805</td>
<td>12005</td>
<td>12205</td>
<td>12405</td>
<td>12605</td>
<td>12805</td>
<td>13005</td>
<td>13205</td>
<td>13405</td>
<td>13605</td>
<td>13805</td>
<td>14005</td>
<td>14205</td>
<td>14405</td>
</tr>
</tbody>
</table>

Loads Shown To Right Of Heavy Line Produce Deflection Exceeding 1/450 Of The Corresponding Span.
The Railmaster™ system is a varied selection of underslung cranes and overhead runway equipment. The cranes and runway can be interlocked to enable transfer of loads from crane to runway or crane to crane for maximum flexibility of hoist hook coverage. Some of its main features are:

- A tough hard wearing alloy steel used for crane runways and bridges.
- All crane wheels are flangeless, have hardened treads, are mounted on ball bearings.
- Trolleys are fitted with ball bearing mounted side rollers.
- All trolleys are articulated being mounted on taper roller bearing spherical seatings.
The interlock is composed of the connecting interlock shown at the left of the illustration, and the crane interlock shown at the right. The crane interlock is operated by a control lever. Interlock is operated by pulling the pendant operating control handles as the crane approaches the track to which it is to be interlocked. When pulled, the latch tongue is pushed out. When it approaches the connecting interlock, the tongue is pushed back by compressing a spring, which forces it into the connecting interlock when the two tracks are in line. When the tongue enters the connecting interlock, it strikes a cam which rotates the axle to which the pendant stops are attached, thus raising them. At the same time, the upper part of this cam comes in contact with a roller cam attached to the shaft in the crane interlock. The crane is now locked rigidly in line with the connecting track and the stops are automatically raised so that the trolley is free to move from one track to the other.

When the latch is in the unlatched position, the crane track passes the stationary track freely without operating any of the mechanism. The stops remain in position until the latch tongue again enters the connecting interlock and interlocks the two tracks. The stops are always directly in the path of the trolley wheels until the crane is securely interlocked.
**Railmaster™ Switches**

This is a heavy-duty range of manual or power operated glide switches designed, like the Monorail range, for easy operation and smooth trolley passage through the curved section of the switch.

The arrangement comprises jig-welded frames, a spring-loaded latch mechanism and robust safety guards to protect the open track ends. The switch section is accommodated within the frame and, equipped with needle bearing runners, slides smoothly on the framework.

As standard, all Railmaster™ switches can be fitted with a combination of one straight and two curved tracks to give 2-way, 3-way or Y-type operation.

Turntables, 3-way rotary and cross track switches are available to suit individual requirements.

The Railmaster™ switches are designed to accommodate four Kant Shock™ insulated conductor bars within the framework of the switch. On automatic installations two additional bars can be accommodated by increasing the depth of the switch.
A standard range of either manually or power operated glide switches is offered. These are available with the choice of either electrified or non-electrified track segments, according to specific requirements.

Intended only for single track installations they enable Monorail trolleys to be easily transferred from one runway system to another, as required, without interrupting the work flow.

**Lift and Dip Machines**

Lifting and dipping operations can be performed on the Railmaster™ Monorail System without load transfer. Similarly loads can be transferred between high and low level tracks.

The machines can be operated by air or electric power.

The illustration shows the vertical air cylinder application with twin guides. When headroom is limited a similar arrangement can be accommodated with operation by an air cylinder horizontally mounted above the dip section.

End stops on both the dip beam and the adjacent track ends operate automatically and ensure complete safety when the dip beam is lowered.

We have a broad range of I-Beam monorail components such as:
Railmaster™ Monorail Systems

Monotracitors

Monotractor transporters will tow heavy loads under power, with perfect control, along runways and through monorail switches and bends of minimum radius.

Equipped with a solid rubber-tyred drive wheel they guarantee fast, smooth, quiet operation. In addition, track wear is practically eliminated and the compact design enables maximum tractive effort to be achieved from a relatively small motor.

Power feed collectors are attached to the Monotracitors trolley yokes and are in spring loaded contact with the bus bar system. It is an independent power feed arrangement ensuring positive power pick-up at all times.

RV101

This range of tractors caters for the twospeed travel demands of heavy loads on push button controls or under automatic transfer operations. Maximum live load capacities are 11,200 lb (5,080 kg).
RV104

This is a general Purpose tractor range with a maximum live load capacity of 4,480 lb (2,036 kg).

It is designed specifically to power travel loads with perfect control at all times.

RV105

This range has been developed for automatic travel installations where the horsepower and motor frame size determines a modified design. It is ideal for particularly arduous site conditions and its driving characteristics permit its use on inclined tracks.

The Monotractor can be utilized as an independent drive for hoist or skip transportation. The unit can also form an integral part of any specially designed transporter assembly.

The arrangement provides for smooth, gradual acceleration when traveling under load on either manual or automatic control.

When operated manually, push button controls for all motions are combined in one pendant box suspended from the Monotractor and enable the operator to remain clear of the load while effecting accurate spotting of the load.
Applications requiring greater clearances, such as handling steel sections into and out of racking, can be accommodated by fitting a swivel assembly. This arrangement, mounted on the Monotracor extends the controls further from the load and provides the added flexibility of 90° rotation at each side of the track centre line.

On automatic systems the heavy localized wear which can occur due to continuous starting and stopping at pre-programmed points is avoided since tractive effort is applied through the rubber tire drive to the underside of the track.
Monotractor Transporter

Installation of Erector Monorail System for Paint Booth

Features:

- Floor Supported - complete with Columns and Double Channel Superstructure
- Superstructure outside of Paint Booth Monorail inside Paint Booth
- 1000# Trolleys - total System capacity 20 Tons
- Two Glide Switches
- Flexible Installation with Clamps, Sliding Hangers and Double Channels
- System was complete and installed in 3 weeks from time of order

For the Veterinary Medicine Monorail System in University
<table>
<thead>
<tr>
<th>For the Construction Industry</th>
<th>Cableway Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacing the Facade on a 20 story</td>
<td></td>
</tr>
<tr>
<td>&quot;MA Bell&quot; Building</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>![Image 1](Image 1)</th>
<th>![Image 2](Image 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image 3](Image 3)</td>
<td>![Image 4](Image 4)</td>
</tr>
<tr>
<td>![Image 5](Image 5)</td>
<td>![Image 6](Image 6)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>![Image 7](Image 7)</th>
<th>![Image 8](Image 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image 9](Image 9)</td>
<td>![Image 10](Image 10)</td>
</tr>
</tbody>
</table>
Cable Way Track

Drive Corner Unit
Trolleys

Splice Trolleys
Double Suspension Load Bars

Idler Corner Units

90° Idler
180° Idler

Take-up Units

180° Take-up
GENERAL INFORMATION...

Engineers are rated and sold on the basis of their pulling capacity in pounds at the drum, not on the number of cars they can pull.

Proper selection of a car puller for any particular application should be made on the basis of existing conditions and the requirements which must be satisfied.

The rope pull required is dependent upon several variables, weight and condition of cars to be handled, the grade, any track curvature or switches and the condition of track, and ambient temperature. A greater pull is required to start the cars than to keep them moving after they have been started. It is assumed that the starting capacity of the electric car puller is a minimum two (2) times the running capacity and sufficient to start the cars moving.

The following information has been tabulated to help determine the required rope pull of a car puller to suit the application and various conditions that exist. (Stanspec Corporation Engineering will be happy to size a system to suit your application upon request, providing accurate pertinent data of conditions and requirements are furnished.)

<table>
<thead>
<tr>
<th>Required (Running) Rope Pull =</th>
<th>W1 (A + B + C) + W2 (D) + W3 (E)</th>
</tr>
</thead>
</table>

Where:

- \( W1 = \) Maximum gross weight of cars and contents (tons)
- \( W2 = \) Maximum gross weight of cars and contents within curved section of track (tons)
- \( W3 = \) Maximum gross weight of cars and contents within switch (tons)

**Example:**

Criteria Given:

A car puller is required to move ten (10) loaded cars, each having a gross load of 35 tons with each car weighing 54,000 lbs. It will be necessary to pull through a 3° curve. A switch track of 12° is present to pull onto siding. Track condition is fair, rail in 115 ft. Lowest ambient temperature at location will be 20°F. Entire track is on approximately 1% grade.

SOLUTION:

- **Rope Pull Required =** \( W1 (A + B + C) + W2 (D) + W3 (E) \)

**Step I:**

Total weight of car =

- \( 35 \) ton + \( 54000 \) lbs = \( 62 \) tons

- \( 2000 \) ft

- \( W1 = (10)(62) = 620 \)

- From Table One (1): Line pull per ton on a Fair track condition

- \( A = 15 \) Lbs.

**Step II:**

From Table Two (2): Line pull per ton for a 1% grade

- \( B = 20 \) Lbs.

**Step III:**

From Table Three (3): Line pull per ton required for operation in 20°F

- \( C = 3 \) Lbs.

**Step IV:**

Assume car length to be approximately 50'-0".

- A 3° curve has a radius of curve of 1910 feet (from Table 4)

- Circumference of Curve = \( (1910 \times 2) \times 3 = 100.00 \) feet

- Number of cars in curve = Circum. of Curve = 100' = 2

- Length of Car = 50'

- \( W2 = (2)(62) = 124 \) Tons

- From Table 4: Line pull per ton for a 3° curve.

- \( D = 4 \) Lbs.

**Step V:**

Approximate length of curve in switch is 67 feet.

- (From Table 6 — 12° curve — lead = 67 feet)

- Number of cars in curve = Lead = 67 = 1.34

- Length of Car = 50'

- \( W3 = Number \ of \ cars \ in \ curve \times \ total \ weight \ of \ car \)

- = \( 1.34 \times 62 \) Tons

- = 83.08 Tons

- From Table 5: Track curvature in switch is 12° — per Note Figure 4: Add 2 Lbs. per degree of curvature

- \( E = 12^\circ \times 2 \) Lbs.

- = 24 Lbs.

**Step VI:**

Final Calculation

- \( W1 = 620 \) tons (Step I)

- \( A = 15 \) Lbs.

- \( B = 20 \) Lbs. (Step II)

- \( C = 3 \) Lbs. (Step III)

- \( W2 = 124 \) tons (Step IV)

- \( D = 4 \) Lbs.

- \( W3 = 83.08 \) tons (Step V)

- \( E = 24 \) Lbs.

**Formula:**

- **Line Pull =** \( W1 (A + B + C) + W2 (D) + W3 (E) \)

- = \( 620(15 + 20 + 3) + 124(4) + 83.08(24) \)

- = 223590 + 496 + 1984

- = 26050 Lbs. of running line pull required.
**TRACK AND ROADBEDS**

**TRACK AND ROADBED CONDITION**

Recommended rope pulls required under favorable weather conditions for running loads (Lbs. per ton) on clean tracks which are free from curves, switches, grades are given in **TABLE 1**. When these loadings are used, it must be verified that the rope is located parallel with and close to the cars being moved. To accomplish this may require the use of vertical guide rollers or sheaves depending on the location of the car puller.

<table>
<thead>
<tr>
<th>Size of Rail</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light: 10-50#</td>
<td>9½&quot;</td>
<td>5½&quot;</td>
<td>2½&quot;</td>
</tr>
<tr>
<td>Medium: 55-105#</td>
<td>5½&quot;</td>
<td>5½&quot;</td>
<td>2½&quot;</td>
</tr>
<tr>
<td>Heavy: 110-175#</td>
<td>6&quot;</td>
<td>5½&quot;</td>
<td>2½&quot;</td>
</tr>
</tbody>
</table>

![Figure 1]

**TRACK CONDITIONS**

<table>
<thead>
<tr>
<th>Track</th>
<th>Good</th>
<th>Fair</th>
<th>Interior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Rails</td>
<td>Level</td>
<td>Slightly Uneven</td>
<td>Very Uneven</td>
</tr>
<tr>
<td>Ties</td>
<td>Heavy-10 Lbs. &amp; Up Per Yard</td>
<td>Medium To Heavy 85-105 Lbs. Per Yard</td>
<td>Light To Medium 40-80 Lbs. Per Yard</td>
</tr>
<tr>
<td>Ballast Condition</td>
<td>Firm, Close, Uniform Spacing On 24&quot; Centers Or Less</td>
<td>Solid Nonuniform Spacing On 30&quot;-36&quot; Centers</td>
<td>Locoe Spaced Unevenly On More Than 36&quot; Centers</td>
</tr>
<tr>
<td>Ballast Condition</td>
<td>Deep Solid</td>
<td>Good, Moderate Depths 5-7½&quot; Below Surface Of Ties</td>
<td>Thin, Weak, Lass Than 5&quot; Below Surface Of Ties</td>
</tr>
<tr>
<td>Running Rope Pull</td>
<td>10</td>
<td>15</td>
<td>20-26</td>
</tr>
<tr>
<td>Required Lbs. Per Ton Of Total Gross Weight</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 1 — Track Factor Loading**

**TRACK GRADE**

Grade in percent = \( \frac{100 \times \text{rise}}{\text{length}} \)

Track grade can be expressed in percent or degrees with each percent of grade representing one foot of rise in each 100 feet of horizontal track. The rope pull (Lbs. per ton) shown in **TABLE 2** are approximate values.

<table>
<thead>
<tr>
<th>Track Grade — %</th>
<th>0.5</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
<th>3.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track Grade — Degrees</td>
<td>0°17'</td>
<td>0°35'</td>
<td>0°52'</td>
<td>1°09'</td>
<td>1°26'</td>
<td>1°44'</td>
<td>2°00'</td>
</tr>
<tr>
<td>Running Rope Pull</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
</tr>
</tbody>
</table>

**Table 2 — Grade Factor Loading**

*NOTE: Closed Loop Car Puller continuous type is recommended where track has grade.*
PECTURE CONDITIONS...

Temperature conditions must be considered when selecting car pullers to be located in regions where cold weather prevails over a portion of the year. The factors shown in TABLE 3 are to overcome bearing friction only. If rope is frozen in ice and snow, special consideration must be taken.

<table>
<thead>
<tr>
<th>Degrees Fahrenheit</th>
<th>50+</th>
<th>40</th>
<th>30</th>
<th>20</th>
<th>0</th>
<th>-10</th>
<th>-20 Below</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running Rope Pull</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lbs. Per Ton Add To Table #1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 3 — Temperature Factor Loading

TRACK CURVATURE

Track curvature is expressed in terms of radius in feet, degrees of curvature or by chordal factor (A). The degree of curvature is the included angle in degrees for a 100 foot chord across the center-line of the track. Factor (A) is the chordal distance for a 50 foot chord on the inside rail. To obtain the chordal factor, stretch a 50 foot line across the curve and measure (A) as shown in Figure 3. It should be noted that this factor applies only to those cars within the curved section. Refer to TABLE 4.

<table>
<thead>
<tr>
<th>Degrees Of Curvature</th>
<th>Chordal Factor (A) Inches</th>
<th>Radius Of Curvature Measured To Center-Line Of Track In Feet</th>
<th>Required Additional Rope Pull Lbs./Tee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/4</td>
<td>5729</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>1910</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>3/4</td>
<td>1148</td>
<td>5</td>
</tr>
<tr>
<td>71/2</td>
<td>4/4</td>
<td>765</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>6/4</td>
<td>572</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>10</td>
<td>384</td>
<td>17</td>
</tr>
<tr>
<td>20</td>
<td>13/4</td>
<td>266</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>16/4</td>
<td>231</td>
<td>25</td>
</tr>
<tr>
<td>30</td>
<td>19/4</td>
<td>194</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 4 — Curve Factor Loading

TRACK SWITCHES

It is recommended that when cars are pulled through a switch the degree of curvature in the tracks at the switch should be established. It is also necessary to know the total length of the curved and straight section of track and how many cars that are in that portion. Table No. 5 shows some typical switch proportions.

<table>
<thead>
<tr>
<th>Freq No.</th>
<th>Turnout Lead Ft.</th>
<th>Sharpness Of Curve</th>
<th>Typical Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>48</td>
<td>21°</td>
<td>Industry Tracks</td>
</tr>
<tr>
<td>8</td>
<td>67</td>
<td>15°</td>
<td>Yards</td>
</tr>
<tr>
<td>12</td>
<td>97</td>
<td>5°</td>
<td>Low-Speed Crossovers</td>
</tr>
<tr>
<td>16</td>
<td>131</td>
<td>3°</td>
<td>Passing Tracks</td>
</tr>
<tr>
<td>20</td>
<td>152</td>
<td>1°45'</td>
<td>Junctions</td>
</tr>
</tbody>
</table>

Table 5 — Track Switches

NOTE: For each degree of curvature in the switch track, add 2 Lbs. per ton for each ton of cars located within the switch section of track.
ROPE STRENGTH AND FLEET ANGLE

DEFINITION:
FLEET ANGLE: The angle of the rope from a fixed sheave or connection point to the drum flange. This condition should not exceed 3° for a grooved drum or 1 1/2° for an ungrooved drum.

*A general rule of thumb for determining the nearest sheave or pin connection is based upon drum length as follows:
For every 12" of drum length center distance is: 20° for ungrooved drum.
10° for grooved drum.

Sheave should be centered on drum length as shown in illustration.
In the event this criteria cannot be met contact the factory for engineered application requirement to suit your particular application.

WIRE ROPE 6 x 37 CLASS — BRIGHT
ROPEs HAVING 27 THROUGH 49 WIRES PER STRAND

<table>
<thead>
<tr>
<th>Diameter (In.)</th>
<th>Fiber Core</th>
<th>IWRC Improved Flow Steel</th>
<th>IWRC Extra Improved Flow Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Approx. Weight Per Foot (Lbs.)</td>
<td>Average Breaking Strength (Tons)</td>
<td>Approx. Weight Per Foot (Lbs.)</td>
</tr>
<tr>
<td>1/8</td>
<td>10</td>
<td>2.74</td>
<td>.16</td>
</tr>
<tr>
<td>5/64</td>
<td>16</td>
<td>4.26</td>
<td>.18</td>
</tr>
<tr>
<td>1/8</td>
<td>16</td>
<td>6.16</td>
<td>.26</td>
</tr>
<tr>
<td>1/4</td>
<td>32</td>
<td>8.27</td>
<td>.35</td>
</tr>
<tr>
<td>1/4</td>
<td>42</td>
<td>10.74</td>
<td>.46</td>
</tr>
<tr>
<td>5/32</td>
<td>53</td>
<td>13.3</td>
<td>.59</td>
</tr>
<tr>
<td>3/16</td>
<td>65</td>
<td>16.7</td>
<td>.72</td>
</tr>
<tr>
<td>1/4</td>
<td>95</td>
<td>23.8</td>
<td>1.04</td>
</tr>
<tr>
<td>3/16</td>
<td>129</td>
<td>32.2</td>
<td>1.42</td>
</tr>
<tr>
<td>1/2</td>
<td>1.68</td>
<td>41.3</td>
<td>1.85</td>
</tr>
<tr>
<td>1/2</td>
<td>2.13</td>
<td>52.6</td>
<td>2.34</td>
</tr>
<tr>
<td>1/2</td>
<td>2.63</td>
<td>64.6</td>
<td>2.89</td>
</tr>
<tr>
<td>1/2</td>
<td>3.18</td>
<td>77.7</td>
<td>3.50</td>
</tr>
<tr>
<td>1/2</td>
<td>3.79</td>
<td>92.9</td>
<td>4.16</td>
</tr>
</tbody>
</table>
You will be furnished a Report for each Crane with the following Cover Sheet

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Company</td>
</tr>
<tr>
<td>Street Address</td>
</tr>
<tr>
<td>City, State, Zip code</td>
</tr>
</tbody>
</table>

Attention:

Enclosed are our Inspection Reports as mandated by OSHA Regulation 1910.179 for your

- Hoists
- Cranes
- Monorails dated __________. These reports reflect the conditions at the time of inspection. Conditions can change drastically with a single misuse! Therefore,

your operators should be trained to visually inspect the equipment before they operate it. If your operators are not properly trained or need to be updated, we would be glad to provide Overhead Crane Training.

The training will include lecture, enhanced with videos, followed by a test to help you determine the level of competence of your operators.

Please be advised that this Inspection made no evaluation of the Design, Engineering and Installation of your System.

Please examine the reports carefully and note that items emphasized with color require your attention and action as follows:
<table>
<thead>
<tr>
<th>Color</th>
<th>Signal Word</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>DANGER</td>
<td>Indicates an imminently hazardous situation which, if not corrected, will result in death or serious injury. This signal word is limited to the most extreme situations.</td>
</tr>
<tr>
<td>Orange</td>
<td>WARNING</td>
<td>Indicates a potentially hazardous situation which, if not corrected, could result in death or serious injury.</td>
</tr>
<tr>
<td>Yellow</td>
<td>CAUTION</td>
<td>Indicates a potentially hazardous situation which, if not corrected, may result in minor or moderate injury.</td>
</tr>
<tr>
<td>Blue</td>
<td>NOTICE</td>
<td>Indicates a potential situation which, if not corrected, could or will result in equipment damage.</td>
</tr>
</tbody>
</table>

Please contact the undersigned with any question or concerns you may have regarding these reports.

True yours,

________________________