Track and Structures

Track Maintenance Training

TRACK GEOMETRY

MODULE ONE

Reading Track Charts

Metropolitan Atlanta Rapid Transit Authority

Infrastructure Training

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READING TRACK CHARTS

Introduction

Reading Track Charts training will provide a review of MARTA standards and practices. At the end of this course, students will be able to properly identify track structures, locations and track related components in accordance with MARTA Maintenance Procedures.

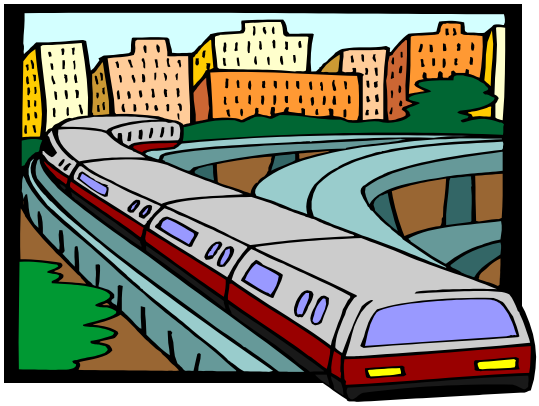
Requirements

Test scores must be 80% or higher on all written evaluations. Only one retest will be allowed on any written evaluation without additional training. All MARTA Track and Structures personnel must demonstrate knowledge of MARTA Track Chart procedures and the ability to identify track related items.

Each student will be asked to complete a class/instructor evaluation at the end of the class.

Learning objective

At the end of this course you will be able to use the Track Charts to identify all the track related components found wayside and in the Track Charts.



Section Objectives

Define Track Chart terms from the list of definitions.

Describe the Curve Data required to perform track alignment, track surfacing and stringlining.

Demonstrate the ability to locate curves and curve points.

Demonstrate the ability to identify track structures and locations.

Demonstrate the ability to identify rail types and their locations.

Describe profile and track grade.

Demonstrate the ability to find all items related to the Third Rail, and describe their function.

Primary role of Track Charts

The primary role of the Track Charts is to define all track related components. To be able to locate and find all, track related components found in the Track Charts and on the Wayside.

READING TRACK CHARTS

The Track Chart Book is set up to always read going away from Five Points Station.

Since Five Points is the center of the rail system, curves are numbered as they go away from Five Points Station. Also the engineering signs located throughout the system are set up the same way.

The Track Chart Book starts from the front with the North line at Five Points Station and goes north to Doraville Station and then from Canterbury to North Springs station.

The second section again starts at Five Points Station and continues South to the Airport Station.

After Airport Station comes the East Line, from Five Points Station to Indian Creek Station.

Then comes the West line from Five Points Station west to the H.E. Holmes Station.

Last is the Proctor Creek line from Ashby Station to the Bankhead Station.

Whether we're talking about Engineering Sign Markers, Curves or the location of any track component wayside, we always reference Five Points Station.

A. CURVE DATA;

Each block of Curve Data has needed information about the curve.

CURVE DATA

CURVE	ER 1	EL 1
Δ	11°39"-375"	11°39"-375"
R	1400'	1400'
Lc	174.92'	194.92'
Ls	110'	90'
E	2.00"	1.75"

1. Curve Data Box

In each Curve Data block there is;

Δ = Delta of Curve

CURVE DELTA: The definition of *Curve* sharpness.

R = Radius of Curve

CURVE RADIUS: The measurement of the sharpness of a *Curve* based on its *Radius.*

Lc = Length of Curve

CURVE LENGTH: The distance from the spiral to curve at one end to the curve to spiral at the other.

Ls = Length of Spiral

SPIRAL LENGTH: The length or distance from tangent to curve or from curve to tangent.

E = Elevation

ELEVATION: The banking of the track by rising or superimposing the *High R*ail above the *Low Rail* at a *Curve*

2. Degree of Curve

While the sharpness of a curve can be described by giving its radius, the more common way is to describe it by the **degree of curvature**. You will not have to determine it in this way, but you can see that the curvature is measured as an angle. Angles are measured in degrees.

- Degrees are subdivided into minutes. There are 60 minutes in one degree.
- Minutes are subdivided into seconds. There are 60 seconds in one minute.

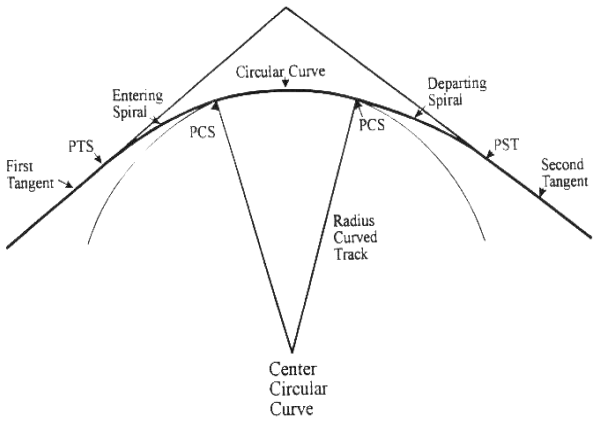
If a curve is described to you as a 2 degree, 30 minute curve (usually written as 2°30'), you should know that it is a 2-1/2 degree curve.

If a curve is described as a 5°45' curve, you should know that it is a 5-3/4 degree curve by reducing the fraction 45/60 to 3/4.

- The greater the degree of curvature, the sharper the curve will be.

As shown in the Track Charts, the Degree of Curve (△) in curve SR20 is 22º34’11.2”.

This information may be needed if a Survey of the track is necessary, but will not be need for most work done on the track.



3. Radius of Curve

All points on a circular curve are the same distance from a certain fixed point, located to the inside of the curve. This distance is known as **the Radius.**

- The greater the radius, the flatter the curve will be.
- The shorter the radius, the sharper the curve will be.

On sharp curves, there are limits on how fast a train can be operated without danger of derailment.

On flatter curves, the speed limits may be determined by the quality of maintenance, rather than curvature.

a) Radius of Curve (R) SR20 is 1600.00 feet.
   - This information is important for taking and figuring Stringline readings.
   - This information should be noted on the Stringline Data Sheet.

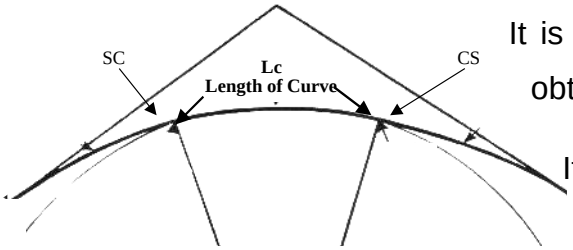
b) It is necessary for the computer program that figures out the alignment and the throws needed for the realignment of the curve to have the radius listed in the String line Data Sheet.

4. Length of Curve

Each curve is divided into different sections. One of these sections is the Length of Curve.

The **Length of Curve (Lc)** is the area from the spiral to curve point to the curve to spiral point. It's the area between the two spirals.

This is where full elevation is reached.



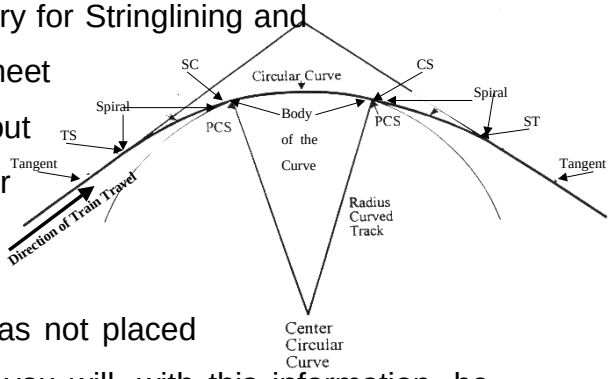
It is here where a constant degree of curve is obtained.

It will also sometimes be called the **Body of the Curve**

- Length of Curve (Lc) shows how long the body of the curve is.
- It is taken from the Spiral to Curve, at the beginning of the curve, to the Curve to Spiral at the end of the curve.

As seen in curve SR20 that is 195.27 feet.

Although this information is not necessary for Stringlining and is not required on the Stringline Data Sheet it is still important information in finding out if the S.C. and the C.S. are in the proper location.



If the curve has moved or the curve was not placed correctly the last time it was surfaced, you will, with this information, be able to adjust the curve to set it in its proper location.

5. Length of Spiral

What is done is to introduce a segment of curve between the tangent and the circular curve which is called a **spiral**.

The spiral consists of gradually increasing curvature from the tangent to the circular curve.

This provides a gradual transition in which the trucks can rotate to the angle required passing through the curve without a lurch.

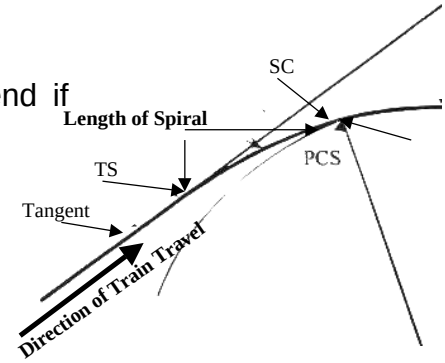
- Excessive thrust against the track structure is avoided.

The length of the spiral required depends upon the speed at which trains will be permitted to operate and the degree of curve.

Spirals are used with most curves with train operations at moderate to high speeds. They are used at both the entering and exiting ends of a curve. They are used to provide a gradual transitions between tangent track and the body of the curve or to transition from the various curvatures in compound curves.

- **Length of Spiral (Ls)** shows how long it is from the Tangent to Spiral (TS) to the Spiral to Curve (SC) or from the Curve to Spiral (CS) to the Spiral to Tangent (ST).

- This reading is taken from the Tangent to Spiral starting point (TS) to the Spiral to Curve (SC) point. As seen in curve SR20 that is 435.00 feet. This tells how long the spiral in and the spiral out are for this curve.
- The Ls may be the same length at both ends of a Simple Curve.
- The Ls may be different at each end if you're in a Compound Curve.



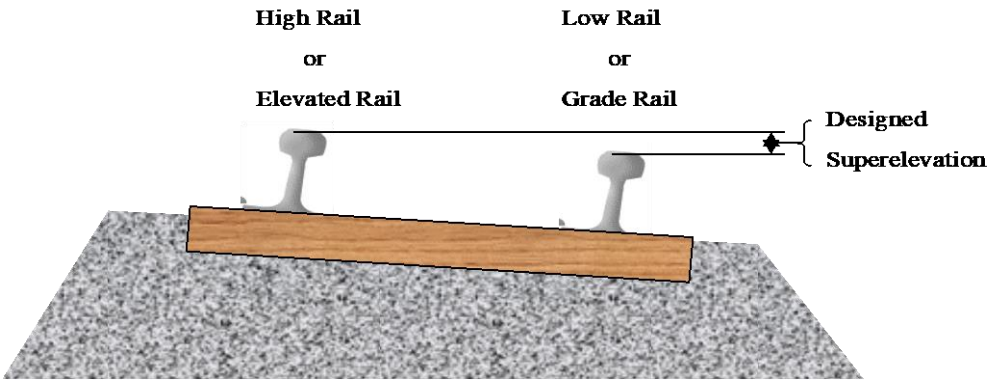
6. Elevation

Most curves have the track banked so that the outer rail is raised above the inner rail.

This banking is properly called **superelevation**, although frequently referred to as **elevation**.

This practice permits a better interaction between the track and the equipment (train) moving over it at substantial speeds.

- The outer rail of a curve is commonly referred to as the **high rail**.
- The inner rail is called the **low rail**.



Another advantage of spirals is that the transition from level track to the full elevation required for the curve can be made in this area.

- This is also an important contribution to smooth riding track.

Superelevation will be studied in another lesson.

Elevation of Curve SR20 is 5.25 inches.

- This tells how much higher the High Rail or Line Rail is in the curve than the Low rail.

Starting from Tangent the Elevation increases in small increments until it reaches full elevation in the Body of the Curve.

- This small increase or decrease in elevation is called the Spiral of a Curve.
- Starting at the Tangent and going up in elevation is called the Spiral In.
- Starting at the Curve and going down in elevation is called the Spiral Out.

Full Elevation does not occur until the Full Body of the Curve has been reached.

This is important information. It will be needed for Stringlining, Surfacing and Lining track.

❖ In the above information only Radius and track Elevation are needed for Stringlining.

✓ On your Stringline Data Sheet, in the areas provided, fill in the Radius and Elevation information.

B. Alignment Data

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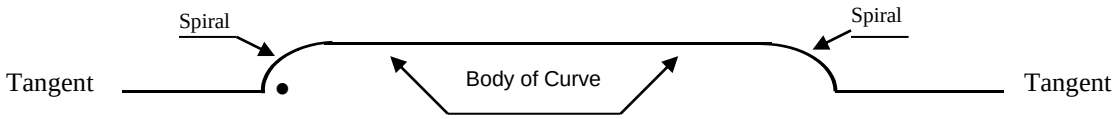
1. Curve Representation,

In this area of the Track Charts, a curve in the track is illustrated by the misalignment of a straight line.



- Such as Curve SR 20 or Curve SL 20.
- This misalignment tells where the track curve begins and ends.

Using the track chart grid the exact location of the beginning and the end of the curve can be determined.

- The area raised above or the area is depressed below tangent track to represent the curve.
- If the area is raised above, this is a Left Hand curve.
- A left-hand curve is a curve that turns to your left if your back is to Five Points Station.
- If the area is below, then this is a Right Hand curve.
- A Right Hand curve is a curve that turns to the right if your back is to Five Points Station.

The method of designating curves as right hand or left hand always relates to the direction of travel and their location going away from Five Points station.

Information also includes;

- Track Identification (EL, WR, NL, SR, etc.)
- Curve number (EL5, WR14, NL9, SL4, etc)

Curves are numbered as to their track and position going away from Five Points Station.

C. GENERAL INFORMATION;

1. Track and Curve Identification,

In the area of general information, different points in the track or curve can be found.

Information includes;

- Track ID. (EL, WR, NL, SR, etc.)
- Curve number (EL5, WR14, NL9, SL4, etc)

2. Curve Points,

Listed below are the points as found in Curve, SL 20.

TS = Tangent to Spiral (427+21)

TANGENT TO SPIRAL The point on a *Curve*, looking from left to right while standing between the rails and facing the *High Rail*, where the *Tangent* ends and the *Spiral* starts.

SC = Spiral to Curve (432+56)

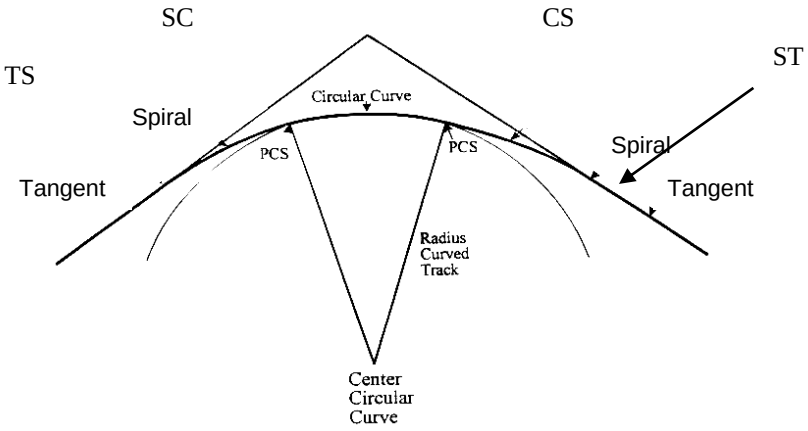
SPIRAL TO CURVE: The point of a *Curve*, looking from left to right while standing between the rails and facing the *High Rail*, where *Spiral Curve* ends and the *Curve Body* starts.

CS = Curve to Spiral (434+98)

CURVE TO SPIRAL: The point on a *Curve*, left to right while standing between the running rails and facing the *High Rail*, where the *Curve body* ends and the *Spiral Curve* starts.

ST = Spiral to Tangent (439+33)

SPIRAL TO TANGENT: The point on a *Curve*, looking from left to right while standing between the rails and facing the *High Rail*, where the *Spiral Curve* ends and the *Tangent* starts.



In Curve SR 20 the TS is 427+31.17 and the TS for Curve SL 20 is 427+21.41.

If we drop the last two digits from both curves then what we have is the curve starting at 427+31 and 427+21 respectively.

3. Engineering Sign Markers

Engineering Sign Markers are every 300 feet apart outside and 100 feet apart in the tunnels.

Using our wayside Engineering Sign Markers it would be easy for us to go out and find this exact location.

- Do not always count on the engineering signs, they may not be accurate.
- Use the track charts to find a fixed point and measure from that point.

3rd rail insulators are approximately 10 feet apart.

Find an Engineering Sign Marker or a fixed point in the track structure and use the insulators to find your location.

4. Change in location numbers

Look at station SL 431+00 and SR 431+00 .

The track chart shows there is an equation change at this point.

- 421+00 is the ahead reading for both tracks
- 428+99 for the SL and 429+00 for the SR track are the behind reading.
- This will accrue every so often throughout the track charts to make any corrections in track locations that are needed.
- The CS for this curve can be found at SL 434+99 and SR 434+61.
- The ST for this curve can be found at SL 439+33 and SR 439+96.

These track location numbers do not match track for track. This is also a reason for using equations.

- This occurs because of the curvature of the track.
- The outside track in a curve is longer than the inside track of that same curve.

With that in mind as the tracks are going away from Five points Station, each track going out will gain or loose footage with the other track.

- This change in track location will take place throughout the system, changing from curve to curve.

5. Finding the right starting point.

- ❖ It is important that the right information for the curve that's being worked is recorded.

Make sure that you read the correct curve information for the curve being worked.

6. Curve Location

Finding the right curve is easy in the Track Charts by locating a landmark,

Train Station	Interlocking	Hi-rail access
Abutment	Aerial Structure	Bridge
Portal	Tunnel	

7. Concentric Curves

There are some curves that are identical. Both the curve on the right hand and the curve on the left hand track are the same. Their radius, degree, length of spiral, length of curve and their elevation are identical.

These curves are called **Concentric Curves**.

As shown on Curves NR 7 and NL 7 north of Midtown Station.

In these curves,

Curve	NR 7	NL 7
Δ	0˚ 51' 9.2"	Concentric With NR-7
R	16,000"	
Lc	238.08'	
Ls	N/A	
E	-----	

Δ = delta

R = radius

Lc = length of curve

Ls = length of spiral

E = elevation

All *are the same from the NL track to the NR track.*

In this case information from one track is the same information needed for the other track.

So the information in the Curve Data Box for the NR track is the same information that is needed for the NL track.

8. Compound Curve.

At some point in the body of the curve might be a 40° curve, while another point may be a 20° curve.

This is known as a **compound curve**. It is possible to put any number of segments of different curvature into a compound.

Look at the Curve Data for curves NR12 and NL12 we will find another type of curve.

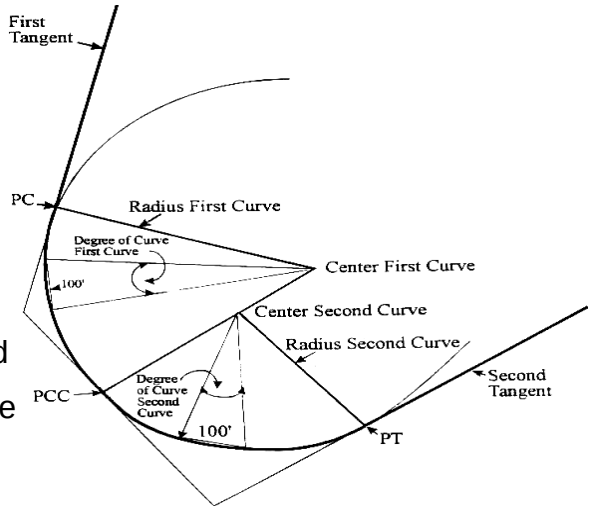
Here we find that the NR12 curve is just like the other curves that we have studied.

It is the NL12 curve that is different.

This type of curve is called a Compound Curve.

A Compound Curve is a curve within a curve.

- Stringline, If you are going to line this curve you must use all the information on that curve and list it on your Data sheet.
- This information is also needed if the track is going to be surfaced.



The information needed includes;

a) All Tangent to Spirals locations
b) All Spiral to Curves locations
c) All Curve to Spirals locations
d) All Spiral to Tangent locations

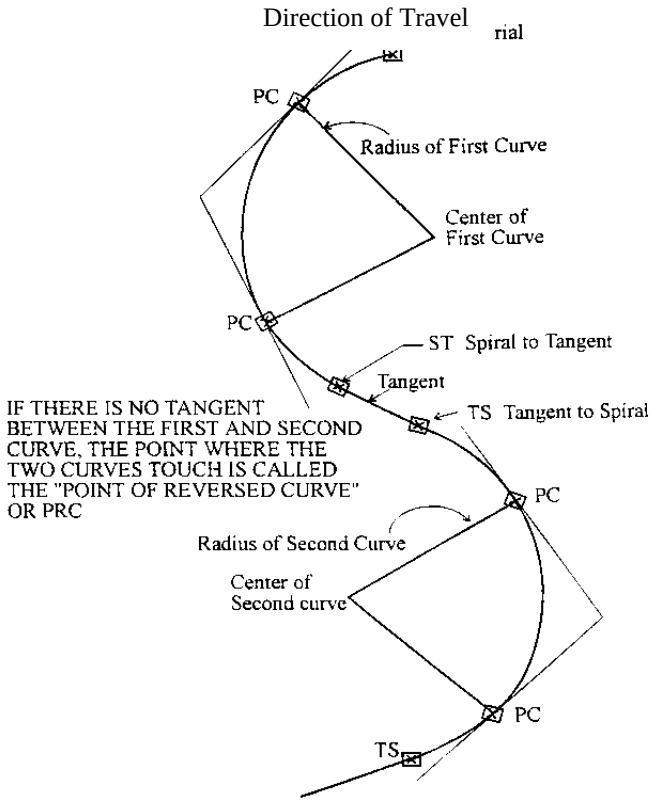
Since a Compound Curve will have one or more of the above curve points, it is imperative that all the information is included.

9. Reverse Curve

For instance, the drawing shows the direction of movement for a certain train. It can also be seen that this train is moving in an easterly direction.

- The first curve this train will pass over is a left-hand curve.
- The second curve is a right-hand curve.

Should a train pass over this track in a westerly direction, the first curve reached would be a right hand curve and the second would be a left-hand curve.



10. Information for Stringlining includes,

Radius of curve NL12, part 1 and 2

a) The radius of curve NL12 part 1 is 3000 feet.
b) The radius of curve NL12 part 2 is 2014.75 feet.

Elevation of curve NL12, part 1 and 2

a) The elevation of curve NR12 part 1 is 3.5 inches.
b) The elevation of curve NR12 part 2 is 6.00 inches.
c) According to the F.R.A. manual, for a class 4 track the maximum elevation in a curve is 6 inches.

Since MARTA is a class 4 railroad, no curves will have a greater elevation than **6 inches**.

What this shows is that there are two (2) different radius and two (2) different elevations for this same curve.

Each must be taken into account when Stringlining and then when surfacing and lining this curve.

Each must be marked on your Stringline Data Sheet and also marked on the track for future reference.

Also there will be two spirals to curve NL12

(SC1 184+34 & SC2 192+55) .

But there will only be one curve to spiral (CS) as the curve spirals out. (201+81)

- ❖ Remember to mark all SC's and CS's in the curve.

If Stringlining is needed,

a) Stringline and gauge readings are done the same as any other curve.

b) Mark the Stringline Data Sheet with stringline and gauge readings in the areas set aside for these readings.

In General Information you will also find the locations of;

Hi-Rail Accesses	Walkway
Platforms	Retaining walls
Switches	Interlockings
Streets that go over or under the track.	
Pocket tracks	Refuge tracks
Storage tracks	Track Centers

All these can be found in the Definition of Railway Terms.

All these points of reference are necessary when finding an exact location of the track.

Many of these may be found in the curve that's going to be worked.

If stringlining, mark the Stringline Data Sheet with the locations of any of these reference points that fall within the curve.

Put its location reference point (such as NR234+20)

The more reference points placed on the stringline data sheet the more accurate your location points will be.

D. TYPE OF STRUCTURE

In this area of the track charts you will find the type of structure that the track is resting on.

1. Different types of Structure,

Since a section of track may have, different structure on which it is built, it is necessary to understand these different types of structures.

On the MARTA system the track could be on one or more of these structural components.

ABUTMENT: A mass of masonry supporting an arch or a beam at the ends of a bridge or an Aerial Structure.

AERIAL STRUCTURE: A long raised structure made of concrete, iron, or steel that allows trains to travel above the surrounding area.

BALLASTED DECK BRIDGE: Is a bridge supporting a standard ballasted track. This provides for an unbroken track structure, allowing for lining and surfacing through the bridge.

BALLASTED TRACK: Any track constructed with ties supported by *Ballast* in the cribs, on the ends of ties, and under the ties. The amount of rise and fall of a track per 100 feet expressed as a percentage. Also refers to *Ballasted Track* at ground level.

CIRCULAR TUNNEL: A passageway cut through a hill or under the ground and made permanent with masonry or a steel jacket for a track to go through.

CONTINUOS FLOATING SLAB: Slab track that is preformed into long sections and not part of the fixed structure.

CROSSOVER: A pair or group of turnouts, which allow trains or track equipment to cross from one track to another.

DIRECT FIXATION: Method of attaching rails directly to *Bridges, Aerial Structures*, or to concrete without the use of ties.

DOUBLE CELL CUT AND FILL TUNNEL: A passageway that was excavated below the original ground level, cut through a hill or under the ground, double tunnels were made permanent with masonry, for a track to go through and then back filled to cover tunnels.

DOUBLE TRACK TUNNEL: A passageway cut through a hill or under the ground and made permanent with masonry, for two tracks to go through.

HORSESHOE TUNNEL: A passageway cut through a hill or under the ground looking like an inverted horseshoe and made permanent with masonry, for a track to go through.

PRECAST FLOATING SLAB: Slab track that is preformed into small sections and not part of the fixed structure.

RETAINING WALL: A wall constructed to hold in place earth or other fill material where available space does not permit a natural slope.

RESILIENTLY SUPPORTED TRACK: Track that is supported by two-block ties or other material used to deaden track sounds.

SLAB TRACK: Track constructed without ties using a concrete base. Rails are connected to the concrete with Direct Fixation fasteners.

SINGLE TRACK TUNNEL: A passageway cut through a hill or under the ground and made permanent with masonry, for a single track to go through.

2. If Stringlining,

Record information on Stringline Data Sheet for any transition from one type of track structure to another.

a) Ballasted track to Direct Fixation
b) Switch or Interlocking to Ballasted track.
c) Resiliently supported track (two-block ties)

- Where adjustments in line and profile cannot be made. Since these ties are set in concrete no adjustments are possible.

d) Tunnel to Direct Fixation
e) Tunnel to Ballasted track

All this information must be recorded to accurately position the track if stringlining or track surfacing and alignment are necessary.

Some portions of the track cannot be moved without great difficulty, such as;

Hi-Rail Access Interlockings Switches

It is important that all such structures are noted.

E. Type of Rail

1. Standard size rail

MARTA uses a standard size rail throughout the system. 115 pound RE rail.

- The RE stands for the American Railway Engineering Association.
- The rail weights 115 pounds for every three (3) feet of rail.

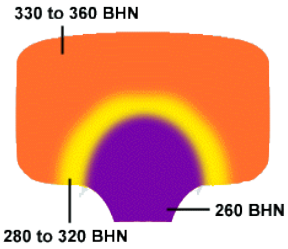
❖ All MARTA running rails are 115 pound AREA rail. What does change, is the type of 115 pound rail that is used.

2. Types of running rail

MARTA uses several different types of this running rail.

Standard carbon, non-heat treated used in tangents. All rail is control cooled, but this is usually used to describe standard hardness and metallurgical content rail. On the MARTA system this rail is usually located on tangents and shallow curves. There are several mill making this type of rail, including, Tennessee; Algoma CC 1988; Workington; Wheeling Pittsburgh.

Heat Treated (HT) used in station platforms, turnouts and certain curves. This rail is control cooled rail which has been treated to increase its strength. This rail cannot always be identified by markings, but some can be identified by the following markings; Illinois, US Steel, and CF&I Head Hardened which has a metal tag attached to the rail web.



Having developed a rail-head hardening process wherein the rail-head is hardened to fine pearlitic structure, while increasing the hardness up to 360 BHN. This hardness is attained at the surface of the rail-head and gradually decreases to normal rail hardness at approximately 40 mm below the rail top. The process involves induction heating of the rails followed by sequential compressed air cooling.

This results in increasing the service life of the rails.

Alloy rail 1% Chromium, from British Steel.

Chromium content is used to improve wear characteristics. This rail is found on the North Line between Arts Center and Brookhaven, and on the South Line between West End and East Point, This rail is stamped Workington 1 CR. Chrome/Alloy from Wheeling-Pittsburgh.This is another alloy rail formulation and is found in the CY154 area. This rail is stamped Wheeling Pittsburgh WWR.

3. MILL BRANDS

Mill Brands are raised characters rolled into one side of the web of a rail. Identifying,

1) Manufacturer
2) Rail section
3) Year and Month rolled.

On the opposite side of the rail, additional information will be stamped into the rail web.

Typical Mill Brands on rails found at MARTA:

wt. sec. trt. Manufacturer and Mill
115 RE CC BETH STEELTON 1995 IIIII

Manufacturer trt. weight & sec. Year
ALGOMA CC 115 RE 1988

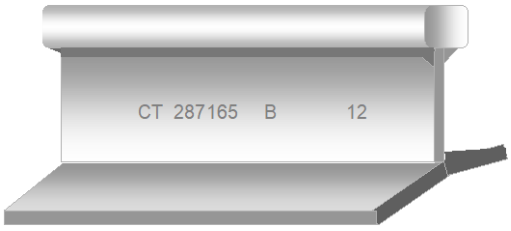
Weight - section - Treatment Manufacturer
11525 - RE - CC TENNESSEE -
USA - 1976

4. RAIL STAMPING

Typical Rail Stampings on Rail found at MARTA:

From the Bethlehem Steelton Rail:
27743 FT P 44

From the Algoma Steel Rail:
1H0490E C 4 6



The Rail Stamping is letters and numbers that are hot stamped in depressed figures and letters into the rail web on the side opposite the Mill Brand at the time of manufacture.

It includes the **heat number**, which is information as to the source of the rail from the molten steel at the mill.

It is made up of a number (heat), a single letter that identifies the rails location in the ingot of raw steel,

Or another number that identifies the ingot number from the particular heat.

- It may also include the type of treatment and alloy information.

5. About the rail

All rail is **Control Cooled**, but this information is still required to be on the rail, in the form of the letters **CC** either rolled into the Mill Brand or included in the stamping.

High strength rails will be marked by either a metal plate permanently attached to the web or hot stamped in the web,

Rolled into the web is the Mill Brand which will give the type and/or method of treatment.

For instance, the letters **CC** indicating **C**ontrol **C**ooled might be replaced by the letters **HT**, indicating **H**eat **T**reated.

6. PAINT MARKINGS OF RAIL:

Heat-treated and alloy rails **will have orange painted ends.**

Standard Grade 1 - 39' rails **will have white painted ends.**

The Track Charts will define what type of rail goes into each area of track. This is important when replacing rail becomes necessary. Replace one rail with the same type that was taken out.

F. PROFILE:

1. Profile

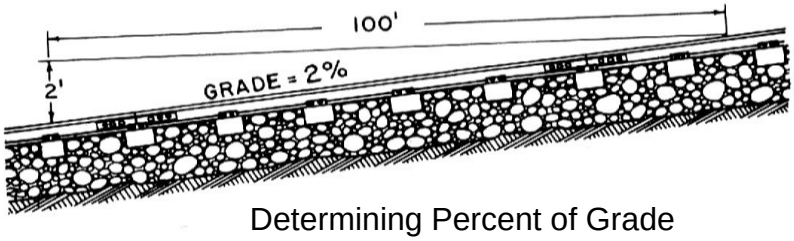
Profile will show the following,

Percent of grade is measured in the rise or fall of a track, in one foot per 100 feet of horizontal measurement along the track.

Track Grade,

- Such as a track having a 2% grade.
- This tells how steep the grade is.
- The larger the number the steeper the grade.

Grade is determined by measuring the drop of the track from one point to the other over a 100 foot section.



Determining Percent of Grade

If the drop is 2 feet over that 100 foot section of track then that would make it a 2% grade.

If the drop is 5 feet over that 100 foot section of track then that would make it a 5% grade.

Profile also tells the elevation (from sea level) of the track. Along with the beginning and the end of each platforms

G. TRACTION POWER AND TRAIN CONTROL

The Traction Power and Train Control section shows the third (3rd) rail layout and configuration of the system.

1. Third Rail lay-out

This lay-out shows the following,
Third (3rd) rail anchors locations.

Third (3rd) rail expansion joints locations.

- Where the Third (3rd) Rails break or separates from each other.

Where the third rails are located in the track

- Inside or between the two tracks.
- Outside or on the field side of the track.
- This is determined by putting your back to Five Points Station.

Shows all Third (3rd) Rails located in an interlocking.

2. Third (3rd) Rail Anchors,

Third (3rd) Rail Anchors can be located by looking for an arrow shaped symbol.

→

This symbol will be accompanied by a Engineering location. (Such as 427+00)

Each Third (3rd) Rail Anchor is approximately 800 feet apart.

- The Third (3rd) Rail Anchors are another way to find track locations.

Some Third (3rd) Rail Anchors have been moved because of the Concrete Tie Renovation, or by ties breaking and maintenance crews moving the rail anchor to the next good tie.

- Even if this has happened, the Anchor will still be close to the location that's pinpointed in the Track Charts Book.

Third rail anchors can still be used to locate the four curve points.

a) Tangent to Spiral (TS)
b) Spiral to Curve (SC)
c) Curve to Spirals (CS)
d) Spiral to tangent (ST)

3. Third (3rd) Rail Expansion Joints,

The Third (3rd) Rail Expansion Joints are located through the system.

Third (3rd) Rail Expansion Joints can be located by looking for an open box shaped symbol. ◘

This symbol will be accompanied by a Engineering location. (Such as 431+50)

Each Third (3rd) Rail Expansion Joint is approximately 800 feet apart.

Each Expansion Joint will be approximately 450 feet from the nearest Third (3rd) Rail Anchor.

4. Using Track Charts to Measure Distances,

At the very bottom of each page of the track Charts will be a set of numbers.

These numbers flow across the page, from right to left or from left to right. Increasing or decreasing in value depending on its location to Five Points Station.

Each line in the grid will equal 100 feet.

5. Look on Curve SL/SR20.

a) The numbers at the bottom run, from right to left,

440+00 435+00 425+00 420+00 415+00

b) The numbers are increasing by 5+00 each time.

c) 5+00 equals 500 feet.

- Count the grid lines from one number to the other to confirm that each line in the grid equals 100 feet.
- From 440+00 count over 5 grid lines. Those 5 grid lines go to 435+00. Or 500 feet.

6. Finding Components Using the Grid System.

If a track component can be found in the Track Charts, then using the grid system, the proper track location can be found as well.

On the SL/SR20 curve we can see that the resiliently supported track starts at 440+35 and goes to the portal at 431+25.

The difference of 9+10 or 910 feet.

Look at the 440+35 spot. Now start to count over using the grid lines as a guide.

Since both numbers start in between two (2) grid lines use full grid areas to count. Moving the location to the nearest grid.

- Doing this will get a count of 900.

This will make the exact area only 10 feet off.

That will get close enough to the exact location to be able to find it once that area has been reached.

Using this system it is easy to find the location of any track component.

Review Questions for Track Chart Lesson

1. The track charts start at this station and radiate out, what station is this?

2. From the track charts, can it be determined if a curve is a right hand or a left hand curve?

3. Describe the four curve points.

4. Engineering sign markers are located at what distance from each other?

5. Describe a concentric curve.

6. Describe a compound curve.

7. What is a reverse curve?

8. In the track charts, how can you differentiate between control cooled and heat treated rail?

9. Heat treated rail is painted what color on the rail ends?

10. What is the symbol used in the track charts to define the location of a third rail anchor?

11. The track chart grids are used as measurements in the track charts, how far apart are each grid line in feet?

12. 275+00 is how far away from Five Points Station in feet?