

2018

Open Track Day

Student Handbook



2018 Waterford Hills Road Racing OPEN TRACK DAYS

Open to the public!
Your car + our TRACK

Improve driving skills and have fun on our 1.5 mile road course!

SEASON SCHEDULE
 April 21/22
 May 27
 June 24
 July 14/15
 August 5
 September 2
 October 7

email: OTD@WaterfordHills.com for more info

4770 Waterford Road
 Clarkston, MI 48346
www.waterfordhills.com

- Beginner Classes
- In-Car instruction available
- Drive *your* street car!
- **Snell 2005 or newer helmet required
- *Helmet rentals available if you don't have one!

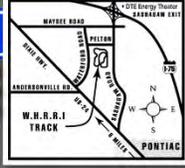



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Introduction

Why have an open track school?

It's pretty simple really – there just isn't enough time to pack all this information into a 30 minute driver's meeting. If you've been to one of my Open Track events, you can attest to the sheer volume of information we literally dump on people that have NEVER been to a track before.

We have to simplify and summarize EVERYTHING! My notes for the driver's meeting are 3 pages long in a font that I can barely read on printed paper. (And that doesn't even include the 2 pages of general rules!)

Having a track school gives us the opportunity to give you the driver ALL of the information we have in a much better setting than a bleacher straining to hear over wind, rain, the track sweeper, or whatever distractions are going on that morning.

So thank you for joining us and taking an interest in improving your driving and track skills!

Ed Frank

“Clutch”

What to expect – A typical Open Track Day

It can be intimidating if you've never done a track day. There's a flurry of activity after the gates open; finding paddock spots, clearing out cars, long haired freaky people running amok... Take a breath and relax because it's all pretty simple... everyone here is just excited and anticipating a great day at the track!

The first thing you come up on is the guard shack at the paddock gate. You and any guests will have to park and see the attendant to sign a waiver and get a wristband to enter the facility. Guests will be charged \$2.00 to come in . (Please bring singles!)

After that you will drive up to the paddock. Note the speed signs - it is 5mph and it is enforced. Go slow and watch for kids and pets.

Your next mission is to find a paddock space. This is a spot where you will unload your car and hang out while you aren't on track. Paddock spaces are anywhere on the grass. Bring a folding chair or something to mark your spot while you are on track.

Go to Registration. Registration is on the second floor of the tower. This is where you get your tech form and driver identification.

Tech your own car. We are only checking your vehicle. You are responsible for everything on your tech sheet. Make sure you pull all loose items out of the car and are ready for inspection. Mark the sheet for the driver inspection as you check each item on your equipment. Don't be afraid to ask a neighbor or any of the staff if you have questions. Track people are Awesome!

Drive to Tech - now is when you drive over and get in line for Tech. Have your paperwork and helmet ready for the inspector. Don't forget to wear long pants and closed toe shoes! The inspector will double check your inspection and if you pass, they will mark your vehicle for the track. Once you are in the tech line make sure you stay with your car.

If you are renting a helmet you will do this once your vehicle passes tech. Helmet rentals are done at the end of the Tech line. They will not rent a helmet to you unless your vehicle has already passed tech.

Return to your vehicle to it's paddock spot. Hopefully you arrived early and you have a little time to wander around. Feel free to do so! If you have enough time before the 9:00am meetings start, feel free to go out and walk the track or go to the top of the tower to take a look at the facility. Introduce yourself to others and ask questions if you have them.

9:00am Novice/New to Waterford meeting. That building you went to for Tech inspection has a stairway that leads to an observation deck. There will be a worker up there that explains where the driver meeting will be, what you are going to do after the driver's meeting and how you will get paired with instructors. The worker will also answer any other questions you have.

9:15am - Driver's meeting! Don't miss it! This is your chance to watch me squirm and wrestle with public speaking. Turn off your phones and listen up. There is a LOT of information we will be giving you in a very short period of time. Pick up as much as you can, and don't be afraid to ask me or anyone else at the track if you need clarification or have a question. Most of the flags and procedures are basic and follow patterns you already know.

9:50am - Novice/New to Waterford low speed drive. This is intended for novices and anyone new to Waterford. This is your chance to go out and drive on the track at low speed so you are familiar with it when you go out on for your sessions. No helmet is required for this run, and you are allowed to bring passengers. Speed is limited to 40mph and there is no passing allowed. Don't be shy - ask an experienced Waterford driver to ride with you. Most people will be happy to show you around.

10:15am - Instructor assignments. Go back to the observation deck on top of the boutique. We will pair you up with available volunteer instructors.

Your first session!

- You'll be watching the tower and listening for your color group to be called to grid.
- Watch for your color in the window of the main tower
- Get your helmet on! Check that the strap is not lose by giving it a downward tug.
- Make sure you've cleared out any loose items.
- Put your seat belt on and line up for grid. (If this is your first time out, let a few people get in line first so you can follow)
- Check your gas! Make sure you have enough fuel to complete the session
- A grid worker will check your helmet and see if you are ready to go on track.
- The workers will guide you from here. Don't be afraid to ask questions!

Driver Preparation

Before the event

- Tech your car
- Get a good night's sleep! Arrive at the track alert and ready to go.
- Bring some basics
 - Water or other liquid to keep yourself hydrated
 - Tarp or plastic to contain your gear in your paddock spot
 - Simple toolkit
 - Torque wrench
 - Air gauge (max 60PSI)
 - Folding chair
- Bring sunglasses or a tinted helmet shield

Pre-Session (before you go out on track)

- Empty your bladder
- Avoid large meal or large amount of fluid immediately prior to driving. However, continue normal intake of fluid during the day.
- Empty mouth of gum, candy, dentures, etc.
- Empty pockets
- Empty car cockpit of loose tools, debris, etc.
- Remove jewelry, watches, etc. However, it is advisable to wear a "medic alert" type bracelet in addition to information on helmet.
- ABSOLUTELY NO SALT TABLETS. Eat salty foods and consume adequate liquids on very hot days.
- Wear all safety clothing
- Wear all belts in proper location
- DO NOT DRIVE if you feel upset, ill, or otherwise "out of sorts".
- No Racing!

Open Track Day Rules and Regulations

Drivers and Instructors:

- **Licensing:** Drivers must have a valid driver's license. Drivers under the age of 18 *MUST* be accompanied by parent.
- **Helmet:** Snell 2005 (SA, K, M) or newer, SFI (3.1.1,41.1, 31.1A, 31.2A, 41.1A, 41.2A), ECE R22.05, FIA (8859-2015, 8860-2010, 8860-2004) and British spec BS6658-85 Type A are acceptable. DOT certifications are not accepted.
- **Clothing:** Long pants must be worn. Long Sleeve shirts and fire retardant clothing are highly recommended for all participants.
- **Shoes:** Closed toe shoes that cover the entire foot must be worn by all participants.
- **Seat Belts:** Your vehicle must contain Good condition, working seat belts.
- **Passengers:** Only Waterford Hills approved instructors are permitted in vehicles during track sessions. ***There are no exceptions to this rule.***
- **Hybrid Vehicles:** Hybrid vehicles that use anything other than Diesel or Gasoline are not permitted.
- **Convertibles** must have a steel roll bar (factory installed fixed and active roll bars are permitted). Vehicles that do not contain a permanent fixed roll bar will be restricted to novice classes.
- **Open Cars Having Factory Installed Roll Over Protection:** Any make of car delivered with factory installed roll over protection which satisfies US Federal Motor Vehicle Safety Standard 216 meets the minimum standards for events (**owner must provide proof that it meets this standard**). The windshield alone is not considered to be roll over protection.
- **Open Cars Not Having Factory Installed Roll-Over Protection:** If a car does not have factory installed roll over protection, a roll bar must be installed, which meets the "broomstick" rule (the driver's helmeted head is below a bar placed on top of the roll bar and windshield).
- **Trucks and SUVs:** Normally a truck or SUV will have a Center of Gravity that is too high to navigate turns at Waterford safely. These vehicles will be permitted on a case by case basis. Please contact OTD@waterfordhills.com if you have questions on your vehicle.
- **Vehicles MUST have a commercially available muffler** and measure below 75dB at our property line. This sound requirement will be monitored and if you cannot meet this you will be required to end your sessions for the day.
- **NO RACING! Anyone deemed racing, driving aggressively, beyond their skills or the capability of the car will be removed from the track.**

Drivers: Registration and Tech:

- Registration opens at 7:00am & closes promptly at 8:45am.
- No space will be reserved unless participant is paid in full prior to the event.
- All remaining reserved spots will be released to walk ups after the driver's meeting.
- Refunds will be processed after the event. Drivers can request a refund or transfer credit in writing via e-mail (OTD@WaterfordHills.com). Transfers are only allowed for the same driver. No-shows are subject to cancellation fees.
- There will be No refunds once your car takes the track. This includes inclement weather, sound issues, mechanical failure or other obstacles.
- Vehicles may be shared by up to 2 qualified drivers. No vehicle will be active in more than 2 run groups. No participant will be registered for more than 1 run group.
- **MANDATORY DRIVERS MEETING 9:30 AM IN FRONT OF TOWER, TRACKSIDE. ALL PARTICIPANTS MUST ATTEND.**
- Before bringing your car to Tech, **YOU** are required to inspect each item as noted on the vehicle inspection portion of the registration form. As you inspect each item, check it off under the driver column of the registration form.
- **Assuring your car is track-ready is YOUR RESPONSIBILITY.** The Tech Inspection Team are only conducting spot checks.
- Annual inspections must be re-inspected if the vehicle is involved in an accident or has had any major work done.
- Tech will apply stickers and numbers to your vehicle windows after a satisfactory inspection has been completed.
- NO working on cars on the paddock roads or paved surfaces. All work must be done in your Paddock spot, No jacks or jack stands on pavement.
- We recommend bringing a good tire gauge and a torque wrench for your wheel lug nuts.
- We reserve the right to refuse access to the track to anyone at any time for any reason.

Everybody:

- EVERYONE in the paddock (including drivers, instructors, spectators, guests, volunteers and staff) must sign a waiver prior to entering into the paddock area or onto the track surface.
- Adults must fill out the Minor Waiver form for all children under the age of 18.
- Wristbands will be issued to everyone after signing the waiver.
- Wristbands must be worn and visible at all times.
- Failure to sign the waiver or wear the wristband will result in your removal from the event.
- There is a \$3.00 charge to enter the paddock. Minors are free, but must be accompanied by a parent.
- Absolutely no illegal substances allowed. No alcohol in the paddock until the last session is over.
- For your safety and the safety of the drivers, do not go beyond the chain link fences or protective barriers surrounding the track.
- 5 mph speed limit in the Paddock. Cars have right of way. Inform your guests to be careful and wait for cars to pass before crossing. A 15 mph speed limit is enforced on the grounds, which includes from the entrances on Waterford Road and all the way up to the paddock.
- For your safety, the paddock access road is closed to foot traffic while cars are on track. You may drive in or out at any time, with an enclosed or open car with roll over protection, but can only walk in or out between sessions or during breaks.
- The tower is for track officials only. Please stay off the top of the tower unless you have a question or issue for someone in charge of the event.
- Keep Grid areas clear for pre-staging
- YOU are responsible for your guests. Please keep pets on a leash and kids under control. If someone who is your responsibility creates a problem, you will be asked to leave with them.
- Keep your areas clean. It was clean when you arrived; please leave it the same way.
- A waste oil container and dumpster are located at the South end of the paddock.
- No Mopeds, pit bikes, personal golf carts, bicycles, roller blades, remote controlled vehicles, drones, etc...
- Pop-up canopies – You are responsible for any damage caused by your canopy. All canopies must be completely secured by means such as straps, bolts, rope or stakes.
- In the event the paddock becomes overcrowded, spectators may be required to park outside the paddock gate.
- Everyone who works to put on this event is a volunteer. Please treat them with courtesy.

Failure to comply with the rules and regulations will result in removal from the property and a possible ban from future events.

*Consider bringing inclement weather clothing, bottled water (concessions is normally open), chairs, and a garbage bag.

If you or a guest would like to volunteer to flag at a corner, it is by far the best seat in the house! You have an up close opportunity to see what others are doing right or wrong. You can chat with our pros to get more insight on the track. Don't be shy... Please see any track worker or official if you're interested.

All entry fees go directly back into maintaining the track, WHRRI is a not-for-profit organization.

TECH INSPECTION

The purpose of tech inspection is to be certain that all cars comply with the required safety regulations. Tech will also check that the car is properly prepared to be on a road course. All of the tech requirements are found on the Registration Form. Conduct the inspection before you come out to the track so you are ready to go.

We've had street vehicles fail tech and sit out for the day for items that could have been solved easily with a quick trip to the parts store the day before.

It is your responsibility to complete the tech inspection on your own vehicle. Waterford inspectors are only there double check your work.

If you are new to this you may want to observe an inspection before completing one on your own. Don't be afraid to ask the inspectors questions while they check another driver's vehicle.

VEHICLE INSPECTION	Driver	Tech
Functioning Safety belts	<input type="checkbox"/>	<input type="checkbox"/>
Roll down/removable windows	<input type="checkbox"/>	<input type="checkbox"/>
No loose items in cockpit/trunk	<input type="checkbox"/>	<input type="checkbox"/>
Functional rear view mirrors	<input type="checkbox"/>	<input type="checkbox"/>
Rollover protection for convertibles	<input type="checkbox"/>	<input type="checkbox"/>
Brakes and brake lights working	<input type="checkbox"/>	<input type="checkbox"/>
Engine bay; no fluid leaks, etc.	<input type="checkbox"/>	<input type="checkbox"/>
Battery securely fastened	<input type="checkbox"/>	<input type="checkbox"/>
Steering/suspension tight	<input type="checkbox"/>	<input type="checkbox"/>
Wheels torqued, no hub caps	<input type="checkbox"/>	<input type="checkbox"/>
Tires good, properly inflated	<input type="checkbox"/>	<input type="checkbox"/>
Tech inspection waived if proof of the following:		
WHRRR 2013 Tech	<input type="checkbox"/>	<input type="checkbox"/>
SCCA 2013 Tech	<input type="checkbox"/>	<input type="checkbox"/>
NASA 2013 Tech	<input type="checkbox"/>	<input type="checkbox"/>
2013 Car Club Tech	<input type="checkbox"/>	<input type="checkbox"/>
GEAR CHECK		
Helmet – Snell 2005 SA K. M. FIA/New	<input type="checkbox"/>	<input type="checkbox"/>
Long pants, closed toe shoes	<input type="checkbox"/>	<input type="checkbox"/>
Inspected by: _____		

Here's a breakdown of what you are checking on our inspection form:

- **Functioning safety belts**
 - Look for loose or cut threads
 - Broken cable tensioner
 - Solid mounting and proper engagement into the receiver
- **Roll down/removable windows**
 - HPDE/Open Track passing requires hand signals through an open window
 - Driver and passenger windows must be down for these events (rain or shine)
- **No loose items in cockpit/trunk**

- Anything not secured in the vehicle is a potential projectile if an accident occurs
- All items need to be removed BEFORE coming into the tech line or going on track
- One of the most important items to remove are the floor mats. Floor mats can interfere with the driver's footwork. Last thing you want to have is a floor mat bunched up under your brake pedal going into a high speed turn.
- **Functional rear view mirrors**
 - Rear view mirrors are required to monitor traffic behind you.
 - If you don't have a mirror, it's difficult for you to see faster traffic waiting to pass
- **Rollover protection for convertibles**
 - If the worst should happen, we want to make sure you are protected.
 - Convertibles must have a steel roll bar (factory installed fixed and active roll bars are permitted). Vehicles that do not contain a permanent fixed roll bar will be restricted to novice classes.
 - Open Cars Having Factory Installed Roll Over Protection: Any make of car delivered with factory installed roll over protection which satisfies US Federal Motor Vehicle Safety Standard 216 meets the minimum standards for events (owner must provide proof that it meets this standard). The windshield alone is not considered to be roll over protection.
 - Open Cars Not Having Factory Installed Roll-Over Protection: If a car does not have factory installed roll over protection, a roll bar must be installed, which meets the "broomstick" rule (the driver's helmeted head is below a bar placed on top of the roll bar and windshield).
 - For reference: NHTSA FMVSS 216 Roof Crush Resistance TP-216-05
- **Brakes and brake lights**
 - Look for worn pads. Front pads should be >25%
 - Rotors - Look for Large cracks and evidence of caliper or other system failure
 - Check the color of the brake fluid. Ask when the last system flush was. Fluid should be changed when it turns brown or every couple of years on a track vehicle.
 - Check for a firm pedal. Soft pedal indicates air or moisture in the system. Air and moisture reduces the boiling point of the fluid and can lead to early brake fade
 - Brake lights – Make sure the vehicle has a working brake light
- **Engine Bay – No fluid leaks, etc.**
 - Get on the ground and look! Check for evidence of fluid leakage under the entire vehicle.
 - If you see moisture, have the owner start the vehicle and let it sit for 5 minutes. Look for leakage on the ground. If it drips, it fails. Small drips add up, and if whatever is leaking breaks loose, we wind up with a slippery solution on the track which can cause a major incident.
 - Check the rest of the engine compartment for evidence of leakage.
 - Look for loose items and poorly repaired systems.

- **Battery securely fastened**
 - Grab the battery and shake... it should not move.
 - Make sure the positive terminal is covered. This is in case a metal panel comes in contact with it in the event of an accident.

- **Steering/Suspension tight**
 - Grab the steering wheel and turn it both ways while watching the front tires. Look for excessive play
 - Go to each wheel and check bearings and play
 - Grab top of tire and shake in/out. Listen for a clunking sound
 - Grab sides of tire and shake left/right. Listen for clunks or loose equipment

- **Wheels Torqued – No hubcaps**
 - The driver should know the OEM specs for lug nut torque.
 - Overtightened or loose nuts could result in a wheel departing from your vehicle.
<https://youtu.be/8guSoWOafkl> <https://www.youtube.com/watch?v=T4fsGWb-HH8>
 - Hubcaps like to take flight during hard cornering. We don't mind if you lose one, but we do mind if it causes an incident because another driver hits it.

- **Tires Good/Properly Inflated**
 - Street tires should show tread.
 - Race tires should have wear indicators (holes) across the width of the tire
 - Look for exposed belts and dry rot cracks
 - Check for low or excessive tire pressure. Novices should start about 2psi higher than OEM recommendation when cold

- **Gear Check**
 - Helmet – Snell rated 2005 or newer. M, K and SA are authorized for Open Track
 - Long Pants – Jeans are fine. Must not be nylon or other “melting” material
 - Closed toe shoes – no flip flops or sandals
 - Not required, but we do Recommend a long sleeve shirt and high visibility driving gloves

Driver's meeting

Every Open Track or HPDE will have an all hands driver meeting before the event. This is a high intensity training course in everything OTD. The driver's meeting is MANDATORY. If you miss it, you won't be going out on track.

This handbook covers a great deal of information contained in the driver's meeting.

Here's the driver's speech in its entirety



Every driver must attend Every driver's meeting. There are no exceptions. Even the most experienced drivers are required to attend.

Flagging and Communication

What those people in White are trying to tell you!

For many of you this will be the first time on a road course. Here are a few things you will learn at the driver's meeting. Take a few minutes and review the info below:

- **Corner Marshals** - these are the wonderful volunteers at the various stations on the track that work to keep you safe. They are out there in rain or shine (and even snow a few times!) Typically they are wearing all white, so they are easy to spot on and off the track. It's hard to hear them at full speed on the track, so they use some basic flags and hand signals to communicate with you. Always acknowledge them when they are signaling you with a nod of your head or hand gesture when safe to do so. Also make sure you thank them-We could not have this event without them!
- **Flags** - These are the basic flags you will need to know while you are on track. When they are displayed they are applicable from that point to the next manned station on the track.



- o **Standing Yellow** - Something has happened ahead of you. Be alert and ready for an emergency maneuver. This flag is also displayed on your first lap at each manned station so you know where the Corner Marshals are.
- o **Waving Yellow** - If you see a Corner Marshal waving the yellow flag there is something ahead of you that is on or blocking the track. Blockage could be anywhere from 1-100% possibly requiring you to evade. This could be a spun car, multiple cars, or even a corner worker. When you see this you need to ease up on the accelerator and PAY ATTENTION.
- o **Red** - This flag means there has been a serious incident. All vehicles on track are to pull over to the side of the track within eyesight of a manned station and come to a safe stop (don't slam on the brakes - we don't want you to become an incident as well!) This is so an emergency vehicle can get by you safely. You will remain there until the Corner Marshal gives you direction.
- o **Black** - When you see this flag displayed to all drivers, we need everyone off of the track. Slowly reduce speed to a reasonable pace and return to pit lane. If this flag is displayed only to you, something might be wrong with your car, you might be doing something wrong, or maybe your driving skills are so awesome, we want to give you a medal! In any case, acknowledge the Marshall, maintain your pace and return to pit lane. If it's just you, you'll be directed by someone near the starter's stand to the penalty box for your reward.

o **Yellow and RED striped** - This is the Surface Flag. It means something is on the track that will reduce your grip if you encounter it. This could be Oil or other fluids spilled by another car, or wildlife - we have had everything from a turtle to deer decide that the track was the place to be during a session. Best advice is to slow down a little until you see what all the fuss is about.

o **Blue with a Yellow stripe** - This is telling you that there is a faster driver coming up on you, or that wants to get by. Please allow the driver pass you in the next approved passing zone for your run group. For those with high horsepower cars, have some consideration for the lower horsepower cars. They will not be able to take you on a straight, but many can easily catch up to you in the turns where you will hold them up. Be considerate. If you know you are holding someone up, you do not need to wait for a flag. Let them by so they can enjoy the ride!

o **Checkered Flag** - You've won! Well... not actually. But by the time you see this flag, you will probably feel like a winner! This means your session is over. When you see this flag, acknowledge the starter with a nod or wave, slow to a reasonable pace and take your cool down lap to let your brakes and engine drop to a more normal temperature. Don't forget when you get back to your paddock spot... **DO NOT SET YOUR EMERGENCY BRAKE!** We've seen the rotors warp and pads stick because the assembly is HOT. Set your car in gear and throw a wheel block down to keep it from rolling.

Hand Signals- Basic hand signals workers use at the track.

- Stop – just like a police officer - hand held up with palm facing you. Workers use this to tell you to hold your position
- Go – a point to you followed by a waiving motion in the direction they want you to go
- GO EASY!: Both palms down, hand held stretched in front, repeated up and down motion with arms. Used when there is severe track blockage ahead or conditions require you to reduce speed
- KEEP TO ONE SIDE OF TRACK
 - PULL TOWARDS WORKER: Palms toward worker, scooping motion with hands towards worker. Used when only the worker's side of the track is clear
 - PUSH AWAY FROM WORKER: Palms away from worker, pushing motion away from worker with arms. Used when only side of track opposite worker is clear
- SLIPPERY TRACK CONDITIONS: One arm palm down, moved in a circular motion parallel to the track. When there is an oil or coolant spill on the track
- POINT PROCEDURE: When driver requests a point after coming to a stop anywhere on the course, the worker holds out a hand as a stop signal, then makes large, full arm pointing motion at the car we want you to pull out behind.
- FIRE EXTINGUISHER HELD OVERHEAD: You are on fire! Pull into turn station if workers are pointing at you. We can then put out your car
- ROLL YOUR WINDOW DOWN: – a circular cranking motion like they are rolling down a car window

Flag Summary

The following chart may be helpful in remembering the flags and their meanings:

Flag Color	Additional Conditions	Flag Location	Flag Meaning	Driver Action Required
Green		Starter's Stand	Track is clear	Drive normally
Yellow	Stationary	All Stations	Incident off track — possible danger	Take care — No passing
Yellow	Waving	All Stations	Incident on track — great danger	Slow down — No passing — Prepare for evasive action
Double Yellow	Standing / Waving	All Stations	All corner stations are under a double yellow condition	Slow down — No passing anywhere on course — Prepare for evasive action — Safety Car may be on course
Red		Starter's Stand - All Corners	Race is stopped	Stop driving immediately — Controlled stop on track
Black w/"All"	Waving	Starter's Stand All Corners	Race is stopped	Slow to 60% and Proceed to pits
Blue w/stripes		All Stations	Driver close behind you	Check mirrors
Blue w/stripes	Waved or shaken	All Stations	Driver behind you is attempting to pass	Check mirrors - do not block
Yellow w/Red stripes		All Stations	Oil, water or debris on track -slippery conditions-	Slow down — Prepare for reduced traction
White		All Stations	Slow moving vehicle on track	Prepare for evasive action
Black	May have # board	Starter's Stand & Black-flag station	Stewards want to talk to you	Come into pits ASAP
Black	Closed (Rolled Up)	All Stations	You broke a rule and we spotted it!	Clean up your act!
Black w/Orange ball	May have # board	Starter's Stand & Black-flag station	There is a mechanical problem with your car	Slow down — Come into pits ASAP!
Checkered		Starter's Stand	Session is over	Slow down — Complete lap and enter pits

Driver Classification

What does that HPDE- "X" mean?

One of the most popular questions I get is "What Class should I be in?" Well, this should clarify how the classes are set up...

HPDE-1 - NOVICE

This group is for people that are new to OTD/HPDEs

You are learning the flags, hand signals and track etiquette

You are new to driving on a road course, and are learning how to navigate the track.

You are primarily focused on your driving and performance.

You are learning to expand your focus to the Corner Marshals

You are reliant on Corner Marshals to let you know someone wants to pass.

HPDE-2 - ADVANCED NOVICE

Some experience - you have successfully completed 2-3 track days either here or at other tracks.

You are familiar with all of the flags and hand signals.

You are comfortable at speed on the track but still working on your line

You are gaining experience and comfort with passing on long straights.

Your focus is expanding to include drivers behind you

You are less reliant on Corner Marshals letting you know someone wants to pass

You know what an "Apex" is.

HPDE-3 - INTERMEDIATE

You have multiple track days here or at other tracks

You know the flags and hand signals well enough to give a speech on them

You have experienced the limits of traction, and have some experience how to resume control

You are highly aware of all driver and Corner Marshal activity around you

You are genuinely surprised if a Corner Marshal has indicated a driver wants to pass and you were not aware of it.

You are learning how to execute passes on low speed turns

HPDE-4 - EXPERIENCED

You measure your OTD/HPDE experience by "Seasons"

You are comfortable passing/being passed at any point on this track

You are embarrassed if a Corner Marshal shows you a passing flag and you didn't already have the passing zone picked out

You are capable of teaching flags and hand signals to a small group of people that do not speak your language.

Tires and brake pads have long ago become a known "expense" that is included in your household budget

You share knowledge with novice drivers on how to get started and improve their performance

Competition - LICENSED RACE DRIVER.

Licenses issued by SCCA, NASA or other major sanctioning bodies are required to run in this class.

This class has open passing

HAND SIGNALS: Each driver has the responsibility of making proper, visible hand signals to inform drivers behind you and to convey to workers when problems arise. These situations specifically include, but are not limited to, the following:

On the Track When Driver Signals: gives you a hand or flag signal – Acknowledge them with a quick wave of the fingers or a big nod of your head

- When entering pit road from the race track or paddock – point to where you intend to go – to the starter or to the pits
- On Pit Lane – tell the starter what you want to do
 - Want more room? Hold both hands together and slowly pulling them apart to show a widening gap. Repeat until he acknowledges you
 - Want to go back on track – Point to the track
 - Return to the pits – point to the pits!
- When being passed by a faster car, signal to him where you expect him to go (to the left!)
- If you find yourself off of the road course
 - Always follow corner worker directions – do not leave your vehicle unless they direct you to.
 - If your engine is running and you can proceed to the pits under your own power:
 - If no workers are in sight and you do not feel 100% comfortable re-entering the track – stay where you are and remain in your vehicle with all restraints on. We will come to you.
 - If a worker is in sight -make eye contact with worker – indicate you want a point by raising one arm in the air.
 - If your vehicle is disabled
 - Try to get to a worker station (preferably manned)
 - Remain in your vehicle with helmet and restraints in place
 - Raise both arms to indicate you cannot proceed under your own power.

Unless it is an emergency, always exit the track via the pit lane.

If your car is on fire –

- Try to get to a manned worker station.
- If you can't, pull off and get out of the vehicle.
- Get to a safe area if available
- If there are no safe zones put your vehicle between you and oncoming traffic
- Keep enough distance to allow you to react
- Run perpendicular to any incoming vehicle or object if possible

Cars may carefully pass emergency vehicles. Cars may also pass other cars that are disabled and cannot keep the pace as signified by a raised arm on the part of the driver of the disabled car

RULES FOR GOING OFF TRACK

It happens to all of us. You are pushing to the limits of your car or your skill and suddenly you've run out of track. It's ok – keep calm and safely return to the paved surface being mindful of workers and other drivers.

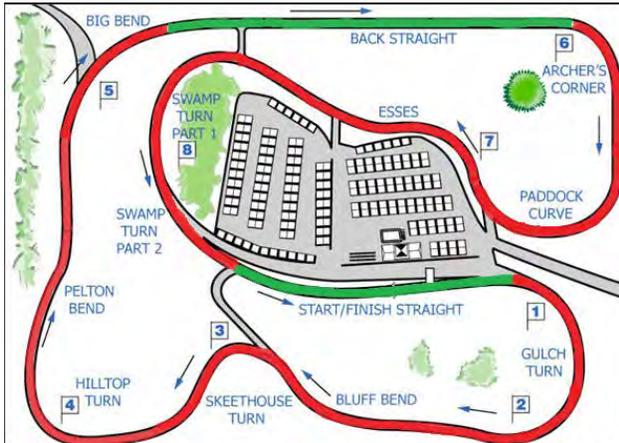
Because this is usually a result of pushing limits, we limit the total number of wheels off to 8. Once you've hit that number we pull you off the course for your safety as well as the safety of the other drivers.

- 2 wheels off – it counts, but you can continue driving
- 4 wheels off – Immediately return to pit lane to inspect your rims and tires for grass intrusion. Grass will break the bead of your tire and replace the air with sod. Continuing on track under these conditions usually results in a blowout because the tire overheats rapidly due to under-inflation and that giant wad of sod rolling around in there.
- Shared Vehicles
 - All wheel off events are counted against the vehicle.
 - Once the Group of drivers sharing the vehicle hit 8 counts, the vehicle is no longer permitted on course.

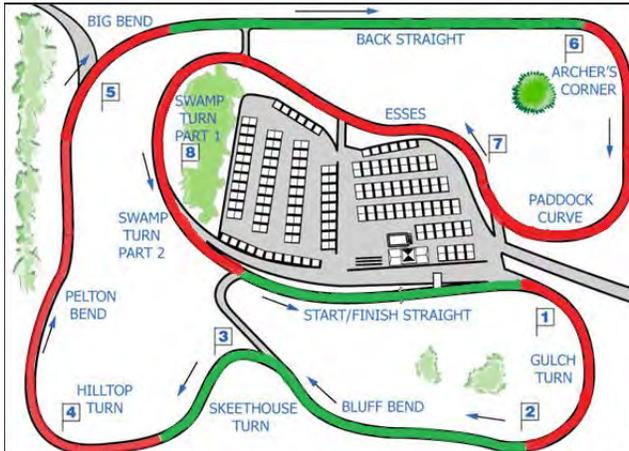
Passing Zones by Group

Here's a graphic representation of the authorized passing zones by group. Red is not permitted, Green zone is for point by passing only:

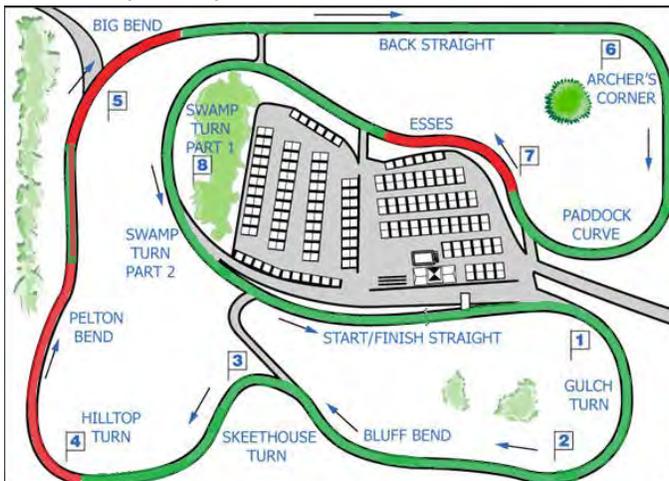
Novice (HPDE-1/HPDE-2)



Intermediate (HPDE-3)



Advanced (HPDE-4)



Passing

With the exception of the Competition groups, All of the run groups at Waterford Hills Raceway have passing restrictions that must be followed to keep everyone safe. Authorized passing zones for each group are shown above.

Procedure

We use a Point By system for passing at Waterford Hills.

The driver being overtaken must Point the overtaking driver by, indicating that the driver is aware that someone wants to pass and is ready for it. All passes will be to the driver's left. No exceptions.

- *It is the responsibility of the overtaking driver to complete a SAFE pass. If in doubt... BACK OUT! Do not attempt to pass if you are uncomfortable with anything about the situation.
- *If you are the driver being overtaken, make sure you give a clear point to the left side of your vehicle.
- *Do not do anything erratic or unpredictable while passing or being passed. OTDs are not races. You are simply conducting a pass to allow a faster driver to get ahead of you.
- Novices – your passing zones are marked at the beginning and end of the zone with double cones.
 - The first set of cones are mandatory. Do not start a pass prior to the first set of cones. You will be flagged if you do.
 - The second set is recommended. Complete your pass safely by the second set. There's no problem you go past them a little bit. We will call you in if you exceed them and put yourself or someone else in an unsafe condition during the pass.
- Pointing
 - Drivers LEFT only.
 - QUICK point. (Give example)
 - Wait until the vehicle is stable to give the point
 - Person behind you is chomping at the bit to pass. They'll see it!
 - Long points are dangerous... get your hand back on the wheel!
- Low Horsepower cars
 - This is a technical course - Low horsepower cars are faster in the turns
 - Can't catch you supercharged fiends in a drag race on the passing straights
 - If you're a high horsepower car with a LHP car wanting to pass
 - Let up on the accelerator!
 - Let them pass!
 - Note the line they take... it's better than yours! (That's why they are faster!)
 - Leave the EGOs at the home. An EGO will get you flagged, ejected.
- Slow moving vehicles
 - If you have a "Train" of cars behind you, we may black flag you to pull you off course to let everyone by.
 - This is a quick fly by
 - Don't argue with the man at the penalty box... it'll only cost you lap time while you discuss.
 - We'll put you right back out on course as soon as the traffic clears.
- If flagged
 - Allow the other driver to pass at the first safe location in the lowest authorized passing zone

Etiquette

- *Blue Flag - The blue flag/yellow stripe is considered the passing flag for an OTD. If the Corner Marshals are showing you this flag, you have a faster DRIVER behind you. Allow this DRIVER to pass at the next authorized passing zone for your group.
- *You might have noticed that I said DRIVER, and not vehicle in the above line. This is because a low power vehicle can be faster than a higher powered vehicle on a road course. The slower vehicle will not be able to pass on straights, so make sure you let up on the gas a bit, allowing them to get by.
- *Mirrors - Part of our tech inspection covers mirrors. They are a requirement to run on our course. Use them! If you see someone riding your bumper wanting to get by, you don't have to wait for a blue flag... give them a point at the next authorized passing zone for your group.
- *Be considerate of other drivers.

Trains

When you have a slower driver followed by faster drivers that don't want to get too close, you form a train. Trains are difficult for a Corner Marshal to sort out because of the large gap between the drivers.

Here's a few options on how to decouple yourself from the train:

- Snug up! Get yourself within a car length of the slower driver. The goal is to show the Corner Marshal that you are faster and want to get by.
- Pit Road - If you're too far back in the train, it may be quicker to pull off onto pit road and ask for a gap. This is done by pulling up to the starter and giving him a hand signal for Gap. Place your hands together and slowly pull them apart horizontally. Repeat until he acknowledges your request. The starter will hold you until an appropriate gap is available. Follow the Starter's direction for re-entering the track.

FIRE and RESCUE

Serious Incident

- TURN WORKERS FIRST RESPONSE: Always with a fire bottle. EMERGENCY SERVICES RESPONDS IF REQUIRED: In case of potential injury.
- EMERGENCY SERVICES OR WORKER IN CHARGE: If emergency services is called, they are in charge of the incident. If not called, the turn captain is in charge.
- IF SENT TO MEDICAL - GO! Sent after serious impacts, rollovers, etc. Please don't throw your helmet either; we have to call that in and it will cost you an X-ray!

Rope (Flat) Tow Procedure

- HELMET: Tow ropes break. GLOVES: Prevent rope burns
- LAP BELT: Brakes that did work suddenly don't, or car may roll over!
- TELL SERVICE CREW OF ANY PROBLEMS & PIT LOCATION: If you can't steer, or the brakes don't work, let them know before you proceed under tow.

Wrecker/Tilt Bed Procedure

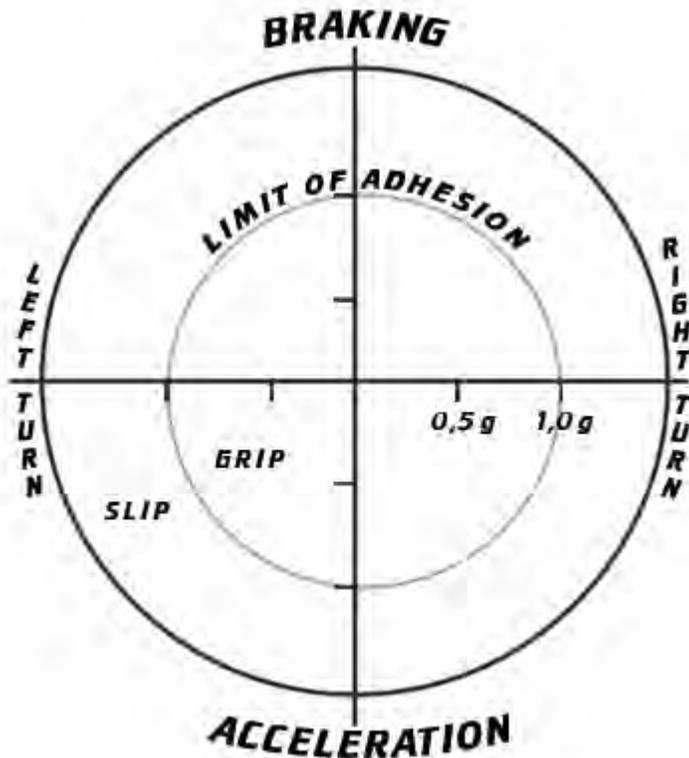
- DRIVER WITH CAR IF POSSIBLE: To tell wrecker crew pit location and how to pick up car.

If an accident is inevitable and If you can:

- grasp steering wheel at bottom with both hands
- move left foot back by seat, away from pedals
- Duck!
- Count to 10 before looking up. It's amazing how long a car can stay in the air before finally coming to rest.
- If injured, remain still
- If uninjured, wave at the nice turn workers
- Leave helmet on
- Follow directions of turn workers at all times
- Rollovers require you to ride back to the pits in the ambulance
- If a fuel leak or fire is present and you think you are on fire, get out and roll over the ground. Keep rolling. This will help put out any fire and bring the turn worker's attention to the fact that you may be on fire. (Ricky Bobby would be proud!)

Traction

- Concrete is good – excellent traction
- Grass/dirt is just like ICE
- Demonstrate how vehicle will rotate if 2 wheels on grass and 2 wheels on concrete with brake or panic wheel movement
- Remind if on grass, you are on ICE. Drive like it's winter!
 - Slowly pull back on course if safe
 - Ride it out if not
 - DO NOT PANIC
 - Don't slam on brakes
 - Don't jerk the steering wheel
- Rumble strips on 8
 - They won't hurt your car, don't panic!
- Show marks on front straight wall where people ignored this advice



Traction Budget

Your tire produces all of its traction in an area about the size of your foot.

As the driver you determine how that traction is applied to the track.

If you go full braking, you take 100% of your budget and apply it to stopping the car.

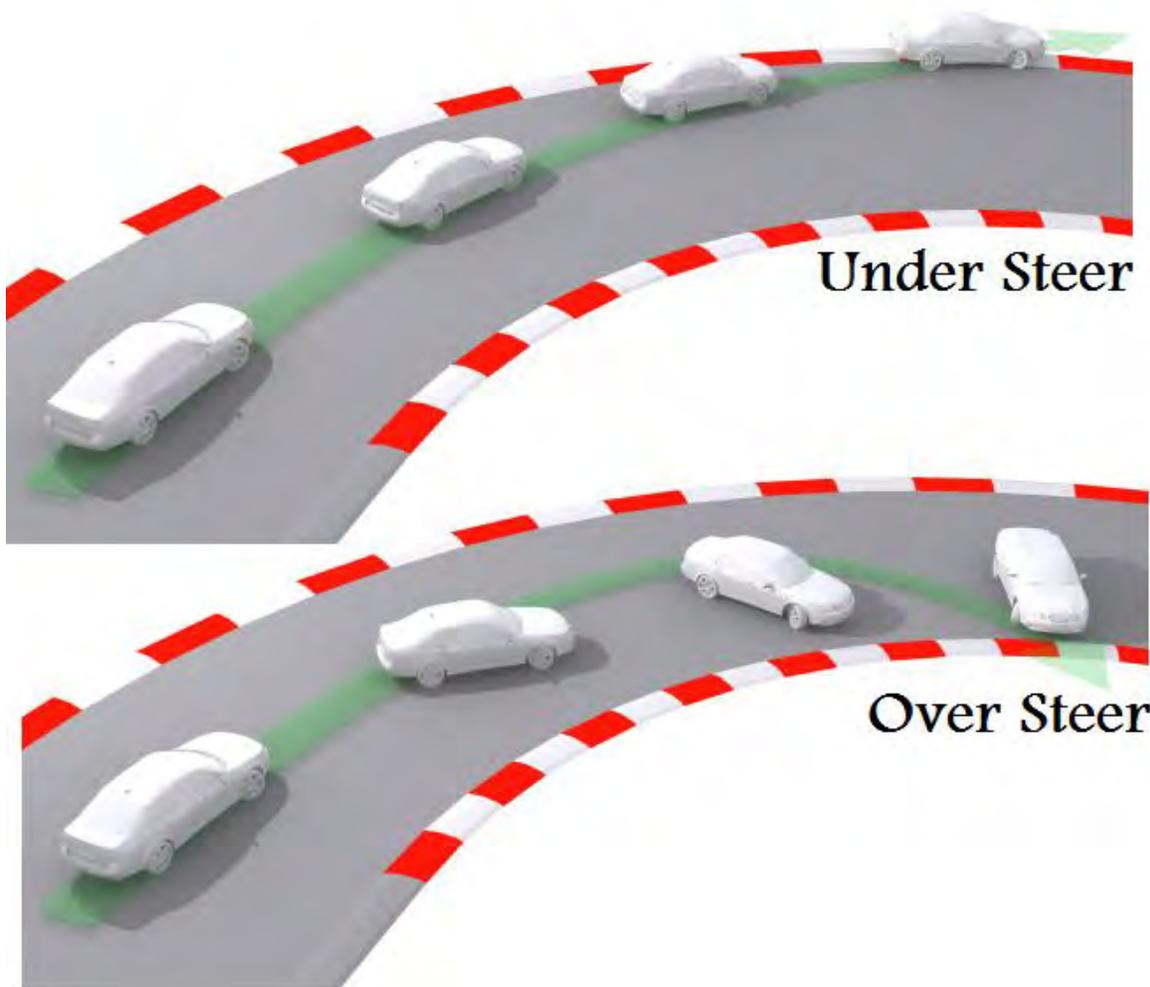
As you get better you'll learn to trailbrake, splitting your budget between turning and braking.

While you're learning, keep this concept in mind as you tackle the track.

Oversteer and Understeer

You will eventually encounter both of these conditions during a track day. Knowing what they are will help you describe the condition to your instructor.

Understeer and **oversteer** are [vehicle dynamics](#) terms used to describe the sensitivity of a vehicle to steering. Simply put, oversteer is what occurs when a car turns (steers) by more than (over) the amount commanded by the driver. Conversely, understeer is what occurs when a car steers less than (under) the amount commanded by the driver



How your Winter Driving skills can make you GREAT!

I know...we can't wait for spring to blast the slippery white stuff away with more tolerable temperatures. While you're driving the rest of the winter, I want you all to keep mental notes on how your driving behavior changes on a snow day.

Being a great driver includes knowing how to react to changing conditions. One of these less-than-ideal conditions is a loss of traction. In my driver's safety speech I always talk about the difference in traction between paved surfaces and grass and dirt. Basically, that once you leave the paved surfaces you have the same traction on grass and dirt as you have on snow and ice.

As a veteran winter driver you already know how you should react when you lose traction. Not panicking is the key to recovery. And why should you panic? You already know how this works. Slamming on the brakes or jerking the wheel on the grass and dirt results in the same thing that happens when you do it in ice and snow ...you lose control. Resisting panic reactions is what your winter driving experience tells you to do.

Gradual responses with the brakes and steering might have you cutting the lawn a little longer, but doing so gives you greater control of your car. Granted, it's not as cool looking on your GoPro video, but I think you'll be happier with the results!

So do me a favor this spring...bring your winter driving skills to the track! Most people will never use them, but if you do wind up in the green stuff, you'll already know what to do because of the white stuff!

Why it's important to Torque your wheels...

If you're new to the Open Track/HPDE experience, you've probably noticed that practically everyone has a torque wrench sitting in their gear.

Why is that? Well it's a SAFETY issue! Stress failures happen. There's a reason this is a requirement for your tech inspection... It's a common failure that is more than likely going to happen during a turn. You're putting a lot of stress on your wheels and suspension during a track session. All of the forces involved in cornering are pushing and pulling your wheels against the hubs and it's mounting hardware. The most common point of failure is at the wheel stud.

Wheel studs take a lot of abuse, and not just the abuse you're dishing out on the track. Odds are your favorite shop is not breaking out the torque wrench to check your lug nuts. Most of them rely on the air tools to snug everything down to get you out the door quickly. When they do that, they may be unknowingly stressing out the wheel stud by over-torquing it. Over torque will stretch the stud, causing weak points that are likely to fail. By torquing the wheels before your sessions, you are checking that the studs are still in one piece and can handle the load.

NEVER torque a hot wheel! The torque settings you have are for ambient temperature. Torquing a hot wheel will result in over-torque, which will eventually cause a failure! I torque mine in the morning, and check it after each of the worker breaks.

The first thing you need to do is find out what your lug nuts are supposed to be torqued to. This is normally shown in ft-lbs. My car requires 100ft-lbs to give you a general idea. You can typically find this in your owners manual, or if you've misplaced it, a quick check online will reveal the specs for your car.

The next thing you need is a torque wrench. Your favorite parts store will have some basic options to fit your needs. Try to stick to a wrench that has your lug nut torque value somewhere in the middle of it's range. Using a wrench that is near it's limits will work, but is not as accurate. Cost... somewhere between \$40 and \$100.00 should get the job done. Pick up an extension and a deep well socket that fits your lugs while you're at it. If you can't afford one, or aren't sure what to buy, ask me or your fellow participants. Most will happily loan you the wrench if you need it.

HELMETS!

One of your primary defenses against permanent damage is your trusty Helmet!

Waterford Hills follows SCCA rules for helmets:

From the 2018 Solo rules:

- **4.3.1 Helmets**
 - *Helmets meeting the following standards must be worn while on course:*
 - *All helmets meeting the latest or two immediately preceding Snell Foundation standards (SA2015, SA2010, SAH2010, SA2005, M2015, M2010, M2005, K2015, K2010, K2005, K98); SFI standards 31.1, 41.1, 31.1A, 31.2A, 41.1A, 41.2A; ECE R22.05; FIA standards 8859-2015, 8860-2010, 8860-2004; or British spec BS6658-85 type A are acceptable.*
 - *Full face or modular helmets shall be worn while competing in an open-wheel car, formula car, or kart. Face shield, goggles, or similar face protection (conventional eyeglasses are not sufficient) shall be worn while competing in any other vehicle with less than the standard-size windshield.*
- **DOT ONLY RATED HELMETS ARE NOT APPROVED FOR WATERFORD HILLS!**

Note that DOT ratings are not included in the approved list above. I'd like to give you all kinds of technical details on why DOT helmets are not allowed, how the testing differs, and lots of other justifications, but I'm not a helmet expert. I can only tell you that the decision to not allow DOT helmets was made, and we cannot allow them for insurance and safety reasons. So the short answer to DOT helmets is:

Take a close look at your helmet, it will have a stamp either on the back or inside under the padding that shows what standards it was tested and approved for. Many helmets carry multiple approvals (SFI and Snell). It is up to you to know where the rating is located so you can show Tech. If you plan on painting your helmet, make sure it has the stamp in a location you won't be covering up. If you can't prove your helmet certification, you can't use it on the track.

Open face vs Closed faced helmets - If you are buying a new helmet, go with a closed faced helmet. Averill of Averill's Racing Stuff:<http://www.racing-stuff.com/> provides safety equipment for many of the test drivers at the Big Three. He highly recommends a closed faced helmet for safety. Don't skimp on this item... Think about it - a \$50.00 helmet is for a \$50.00 head!

Visor/Safety glasses. You're on a road course with other vehicles... they throw up debris as they move around the track. I've been hit in the face with a pebble a few times in the past driving in my hard top Mustang. The windshield only protects you from the front... make sure you wear something to keep the small stuff out of your eyes!

Used Helmets Club racers have to get rid of their helmets sooner than we do - you might consider placing a wanted ad on our Swap and Sell forum. If you do this, inspect the helmet and make sure it hasn't suffered an impact in the past. If it has, or if your current helmet has, you'll need to get yourself a different one. Never use a helmet that's been in an accident and impacted something.

Brake Fade - What is it?

As you begin to gain confidence and experience on the track you will also find you are pushing your vehicle and it's braking system harder than ever.

Typical braking systems use a piston to compress the rotor (disk) between two brake pads. The increased friction converts the vehicles kinetic energy into heat which brings you to a stop.

Brake system heat is easily dissipated under normal driving conditions. When you take that same brake setup onto a road course, it may exceed the cooling capabilities of your stock system. When this happens, the entire braking assembly begins to build up heat.

Indicators of Brake Fade: Once the heat buildup starts to exceed the boiling temperature of the brake fluid, you will notice a spongy feel on the pedal. This is your warning sign that your brakes may not be there the next time you go to use them. Once your fluid begins to boil, you may find your brake pedal on the floor!

If your brakes begin feeling spongy or less efficient, it's time to back off and let the system cool down. Bring your car into the pits and consider replacing your stock fluid with a high temp racing version.

Proper maintenance with the vehicle's use in mind will go a long way. Most passenger vehicles rarely get the fluid changed. If you're doing HPDE or Open Track events, you need to completely change the fluid out every 2 years at a minimum. This is because the brake fluid absorbs moisture over time. This moisture reduces the boiling point of the fluid, and increases the chance you will experience fade under heavy brake usage.

Fluid type, Dry Boiling point / Wet Boiling Point

DOT 3.....401° F / 284° F

DOT 4.....446° F / 311° F

DOT 5.....500° F / 356° F

DOT 5.1....518° F / 375° F

Another simple upgrade is to install cooling ducts for your rotors. Most track oriented vehicles have an aftermarket option for this. If they don't, take a look at your dust shields. Many racers pull them off to increase air flow over the disks during track sessions. (don't forget to put them back for street use!)

If you've decided OTD is your thing, make sure one of the first things you upgrade on your vehicle is the BRAKE system. It's way more important that a vehicle be able to stop over making it go a few MPH faster!

Reference Information

BASIC CAR PREPARATION

How should I modify my Car to make it go faster at the track?

Starting out - Nothing! You need to learn how to drive before you add the burden of learning vehicle setup. Take things one step at a time!

Tires – use a good summer performance STREET tire (typically 200 treadwear) as you begin learning how to tackle a road course. DO NOT get a set of racing tires.

Street tires will talk to you. You get that nice squealing sound before you completely lose traction in a corner. Using street tires will teach you how your car behaves during cornering. You'll learn how to properly compensate for understeer and oversteer events. If you start out with racing tires, you'll cover up major mistakes and develop bad habits that'll be difficult to break!

Perform your tech inspection – learn your car inside and out

As you get better you'll start to notice limitations in your brakes (ie... Brake Fade). Upgrade your pads/rotors and install cooling ducts if required. Upgrade to a higher temperature brake fluid to reduce brake fade.

After you've mastered the above you'll notice your tires are wearing quicker, and probably unevenly. Now is when you start to consider changes to your car to allow alignment modifications (caster-camber plates). Make sure you talk to some of our instructors on what they would recommend for setup and initial modifications. You'll save a ton of cash and a lot of Tylenol trying to figure it out yourself!

SCCA Solo Drivers

A few tips for those of you joining us from the SCCA Solo program:

- Driving styles on road tracks differ slightly from Solo - aggressive application of the brakes and accelerator can get you into trouble. The key to good lap times on a road course is to be smooth. Take a look at an online guide for road track driving: Race Driving Techniques
- Tire pressures - Using the same tire pressure settings you use in Solo will quickly tear up a set of tires on a road track. Your car will be running significantly longer than a solo event. Start your tire pressures near your normally recommended driving settings. Make only minor adjustments between runs (no more than 2psi) to figure out your ideal settings. I learned this the hard way and have a barely used set of overheated, chunked out tires to prove it!

Driving Basics

Contained in this book are corner maps of Waterford Hills showing the classic or traditional lines. Learn the traditional line first. You have to know what you are doing before you can modify it. After becoming comfortable with the traditional line, individual drivers might adapt or modify the line slightly to suit their particular car's handling characteristics.

You must maintain SMOOTH control to get maximum speed. Your entry into a turn (turn-in point) must be performed smoothly, never jerk the steering wheel abruptly. Time your turn-in point so that the car hits the apex of the turn without having to readjust the car's attitude.

"HEEL AND TOE" is a method of downshifting smoothly while braking. If performed properly, the engine speed will match the vehicle speed in the lower gear as the clutch is engaged.

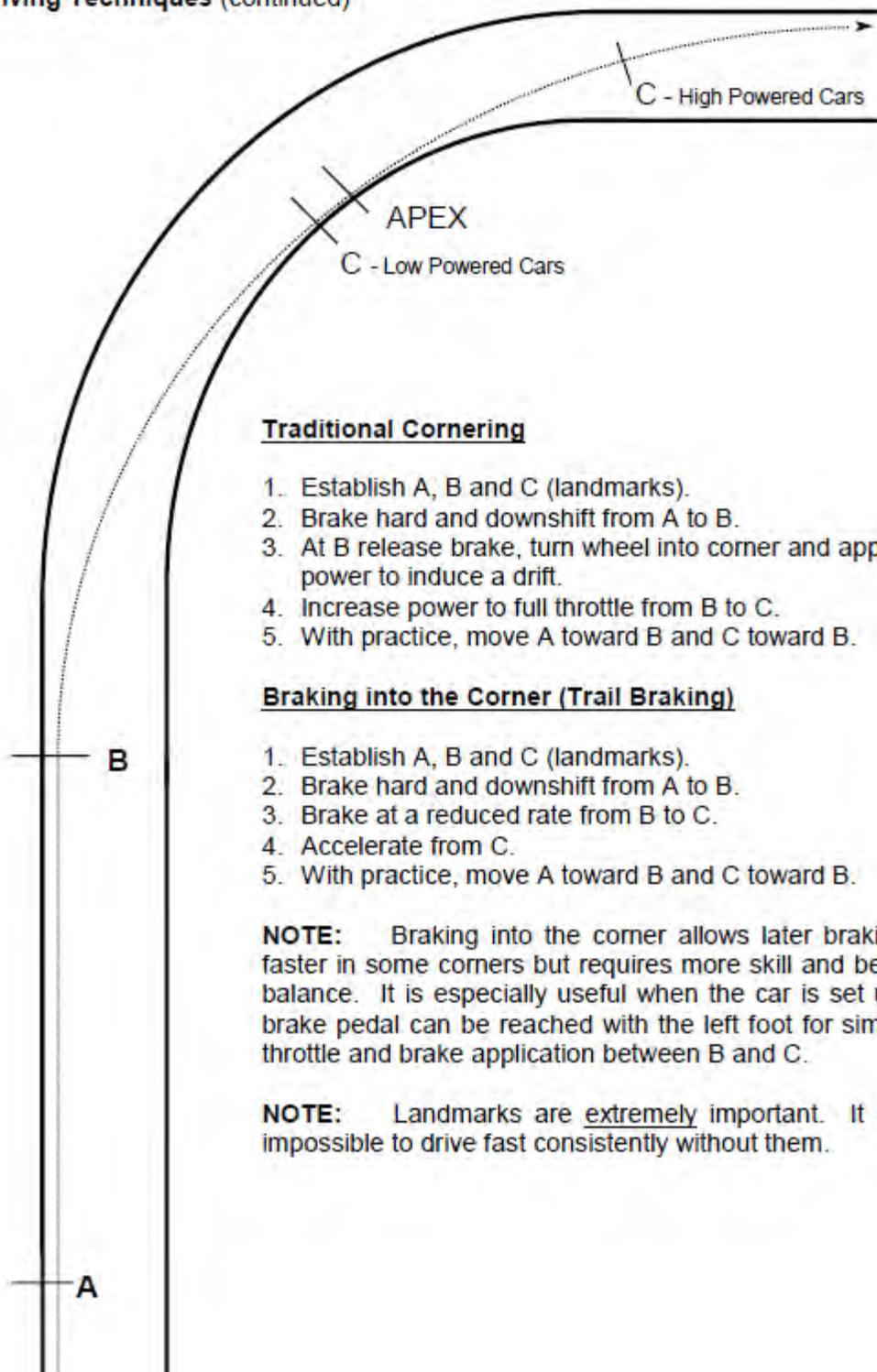
The driver should establish landmarks on the race track to help remember braking points, shift points, turn-in points, and turn apex points. These landmarks could be speed bumps, a damaged piece of pavement, a turn station, etc. Whatever you choose, be certain that it can't move.

"EARLY APEX" or "LATE APEX" refer to adjusting the ideal apex of a certain turn to account for interaction with an upcoming turn, setting yourself up to pass another car, or correcting a handling characteristic of your particular car. Use a late apex where appropriate (especially high powered cars).

Keep hands at 3:00 and 9:00 o'clock. Brake hard and in a straight line.

If possible, do not change gears in a turn.

Driving Techniques (continued)



Traditional Cornering

1. Establish A, B and C (landmarks).
2. Brake hard and downshift from A to B.
3. At B release brake, turn wheel into corner and apply enough power to induce a drift.
4. Increase power to full throttle from B to C.
5. With practice, move A toward B and C toward B.

Braking into the Corner (Trail Braking)

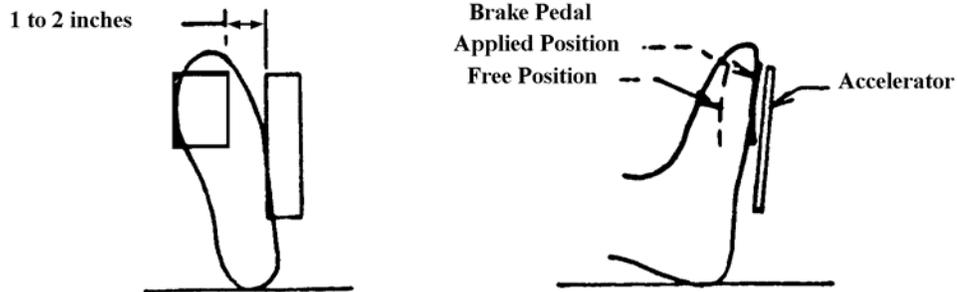
1. Establish A, B and C (landmarks).
2. Brake hard and downshift from A to B.
3. Brake at a reduced rate from B to C.
4. Accelerate from C.
5. With practice, move A toward B and C toward B.

NOTE: Braking into the corner allows later braking and is faster in some corners but requires more skill and better brake balance. It is especially useful when the car is set up so that brake pedal can be reached with the left foot for simultaneous throttle and brake application between B and C.

NOTE: Landmarks are extremely important. It is virtually impossible to drive fast consistently without them.

Driving Techniques (continued)

HEEL TO TOE SHIFTING



Most drivers use the ball and outside edge of the right foot, not the heel and toe, to downshift while braking. To do this easily the brake and accelerator pedals must be positioned so the brake pedal ends up slightly above the accelerator when the brakes are applied. The lateral distance between the pedals should be 1-2 inches, as shown.

Brake with the ball of the right foot on the edge of the brake pedal and about half of the outside edge of the right foot over the accelerator pedal as shown. Do not lift the heel off the floor. When the car has slowed enough to engage the next lower gear without over-revving the engine, perform the following as quickly and smoothly as possible:

- Disengage the clutch.
- Roll the edge of the right foot onto the accelerator while keeping a constant force on the brake pedal (this is the hard part).
- While the engine is accelerating, engage the desired gear.
- When the engine speed matches the transmission input shaft speed, roll the foot off of the accelerator and engage the clutch (this is hard, too). When this matching is done properly the car will not lurch forward and the drive wheels will not lock up.

While learning this procedure go down one gear at a time (4th, to 3rd, to 2nd, etc.) When the procedure is mastered try skipping gears. This saves time and wear on the engine and driveline, but the matching process is more difficult.

Heel-to-toe down shifting is very important and it is not easily learned. If possible, practice in a 4 or 5 speed street machine. Most road cars require accelerator pedal position adjustment for easy heel and toe shifting. A piece of wood bolted to the existing pedal works fine.

Depending on how your car is set up, you will experience one of the following handling characteristics:

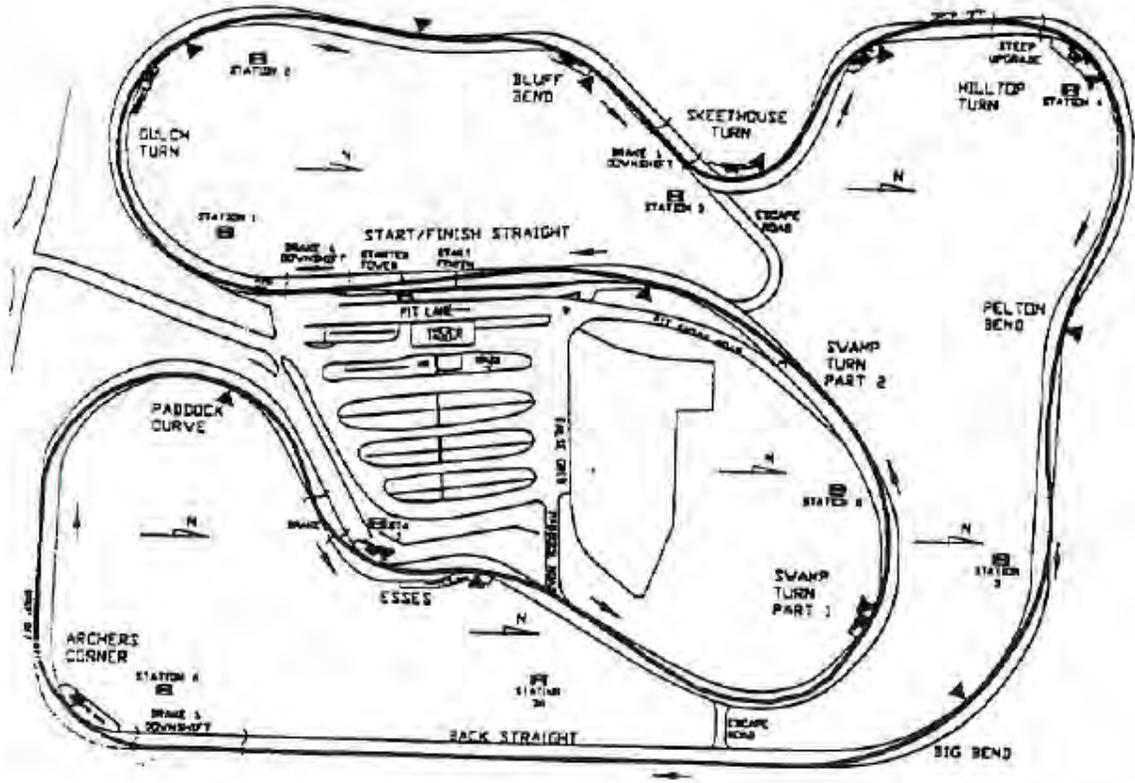
- Understeer is the tendency of the car to turn less than the front tires are telling it to turn. Also called plow or push.
- Oversteer is the tendency of the car to turn more than the front tires are telling it to turn. Also called loose.
- Neutral steer is when the car responds to the front tires as expected.

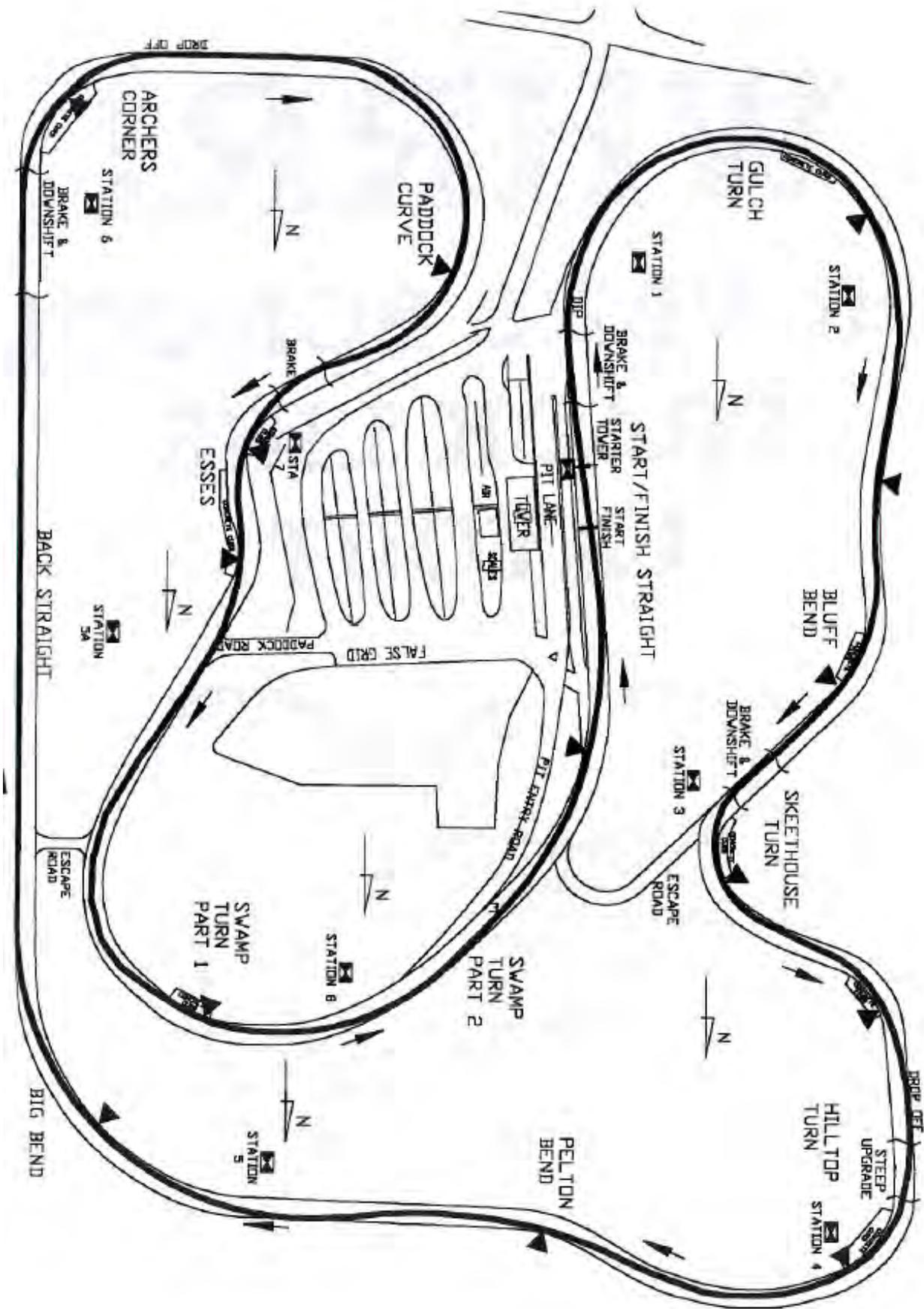
The following chart may be useful if you want to modify or improve your car's handling characteristics:

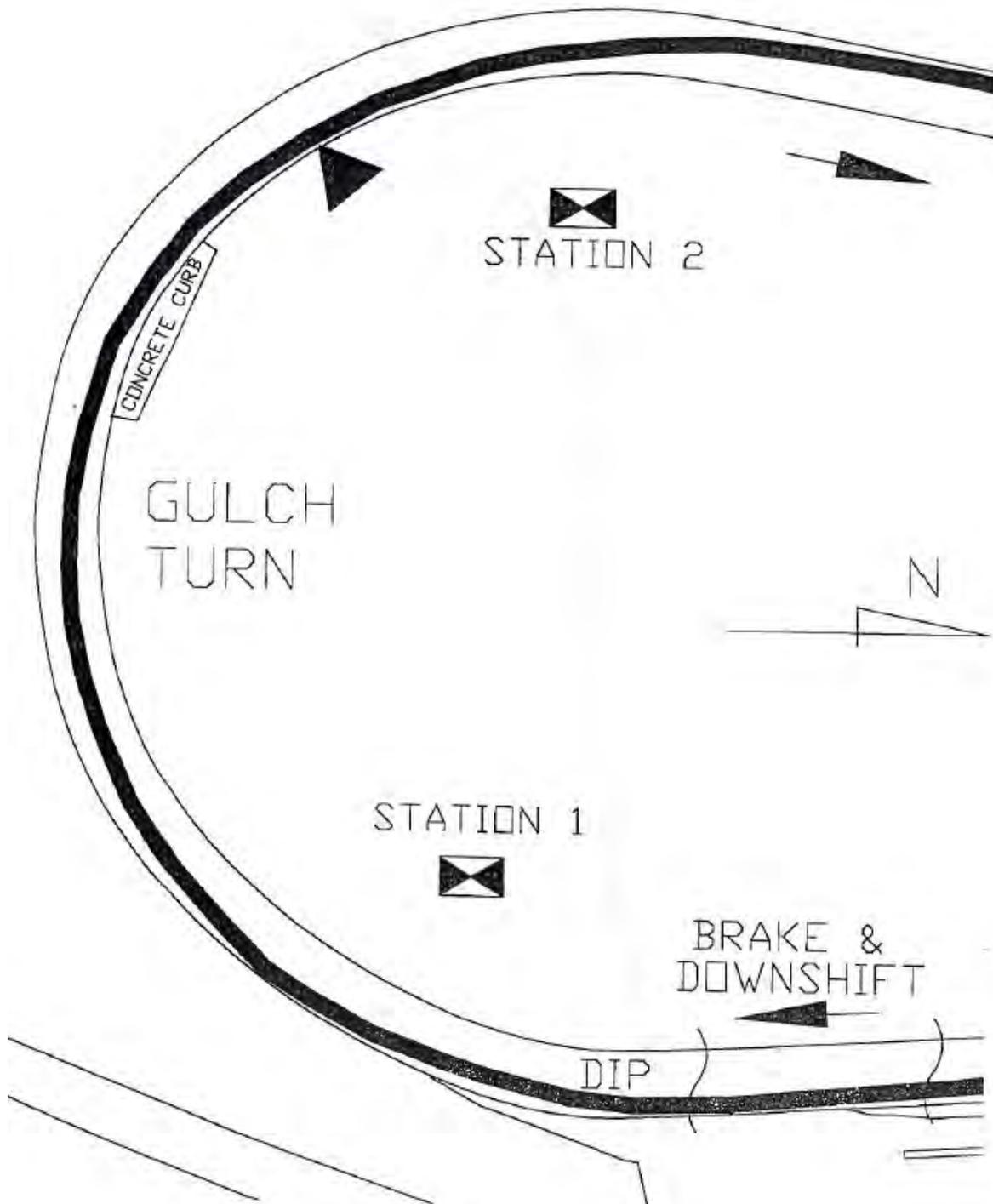
ADJUSTMENT		INCREASE UNDERSTEER	INCREASE OVERSTEER
Tire Pressure	Front	Decrease	Increase
	Rear	Increase	Decrease
Tire Section	Front	Smaller	Larger
	Rear	Larger	Smaller
Wheel Camber	Front	More Positive	More Negative
	Rear	More Negative	More Positive
Springs	Front	Stiffer	Softer
	Rear	Softer	Stiffer
Sway Bar	Front	Thicker (Stiffer)	Thinner (Softer)
	Rear	Thinner (Softer)	Thicker (Stiffer)
Weight Distribution		Move Forward	Move Rearward

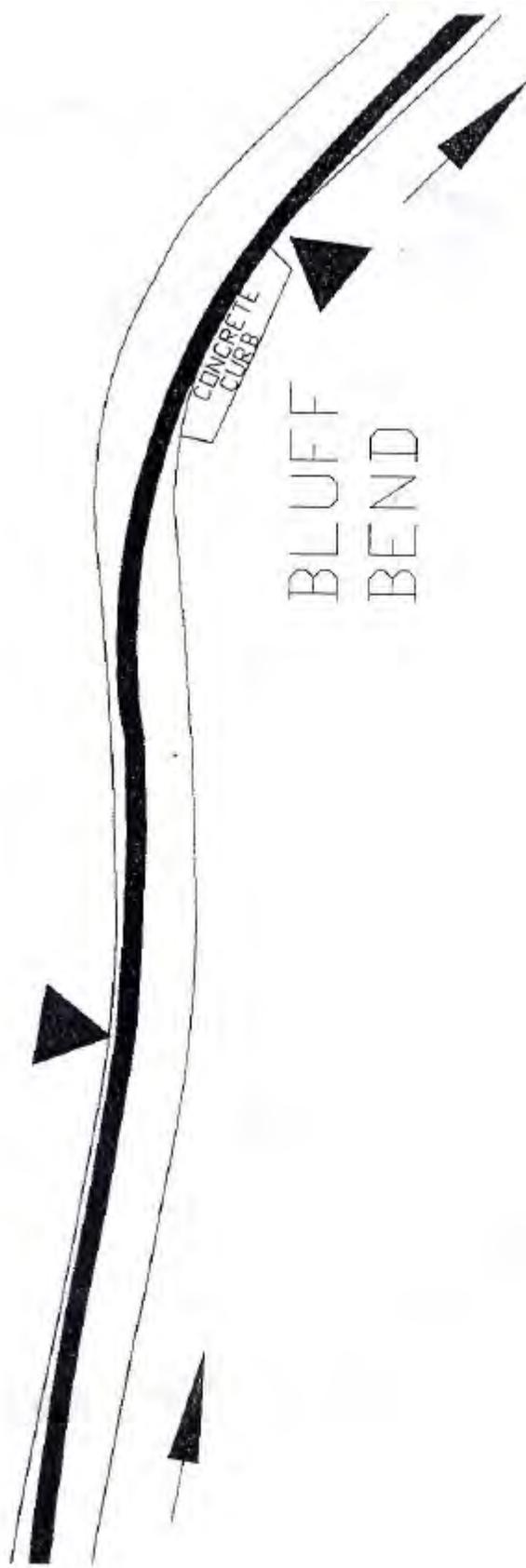
Increasing Toe-in will generally increase understeer (to an extent), but at the sacrifice of straight line speed.

WHRI Drivers School Track Line Layout



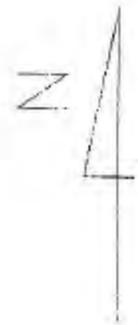


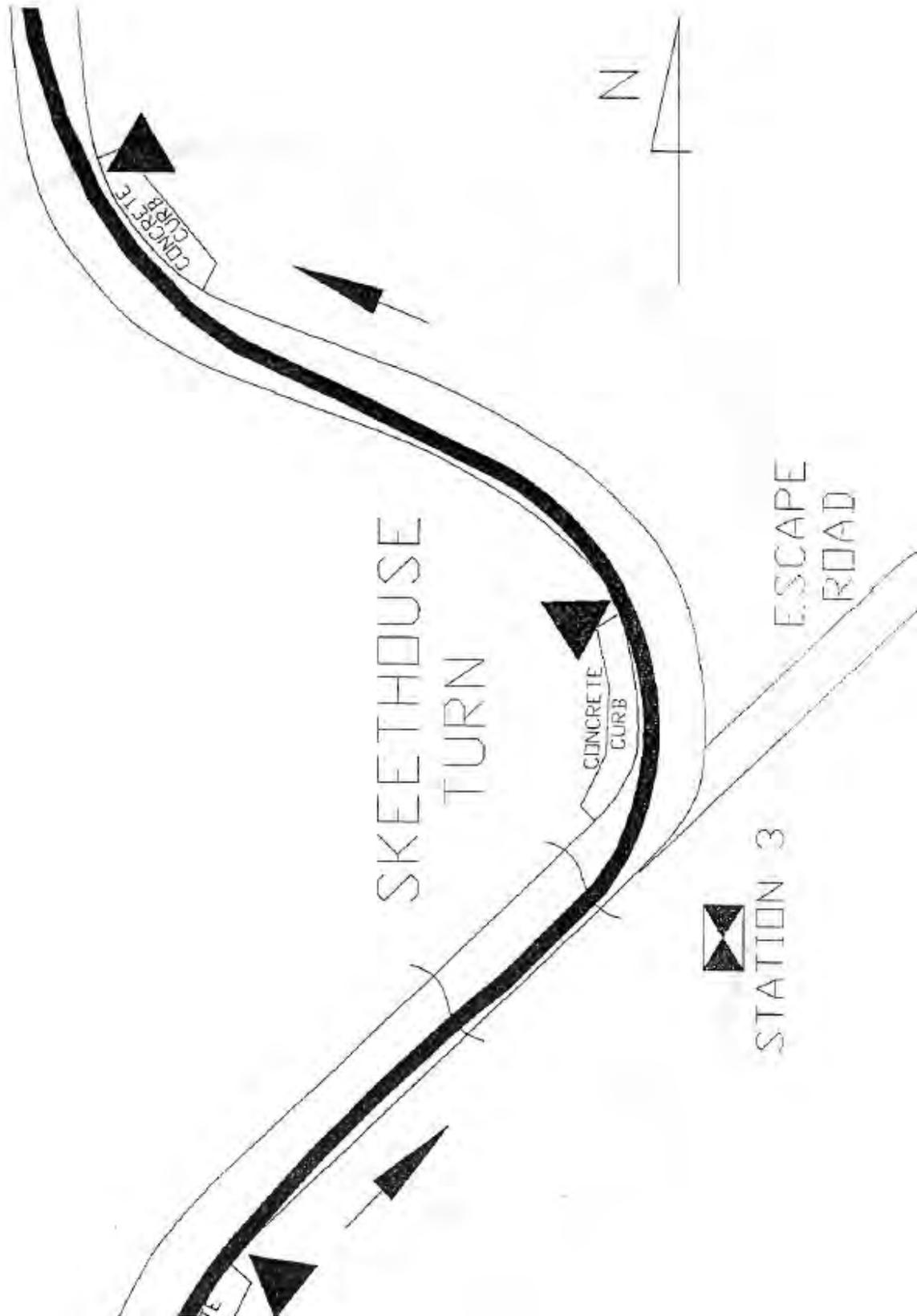


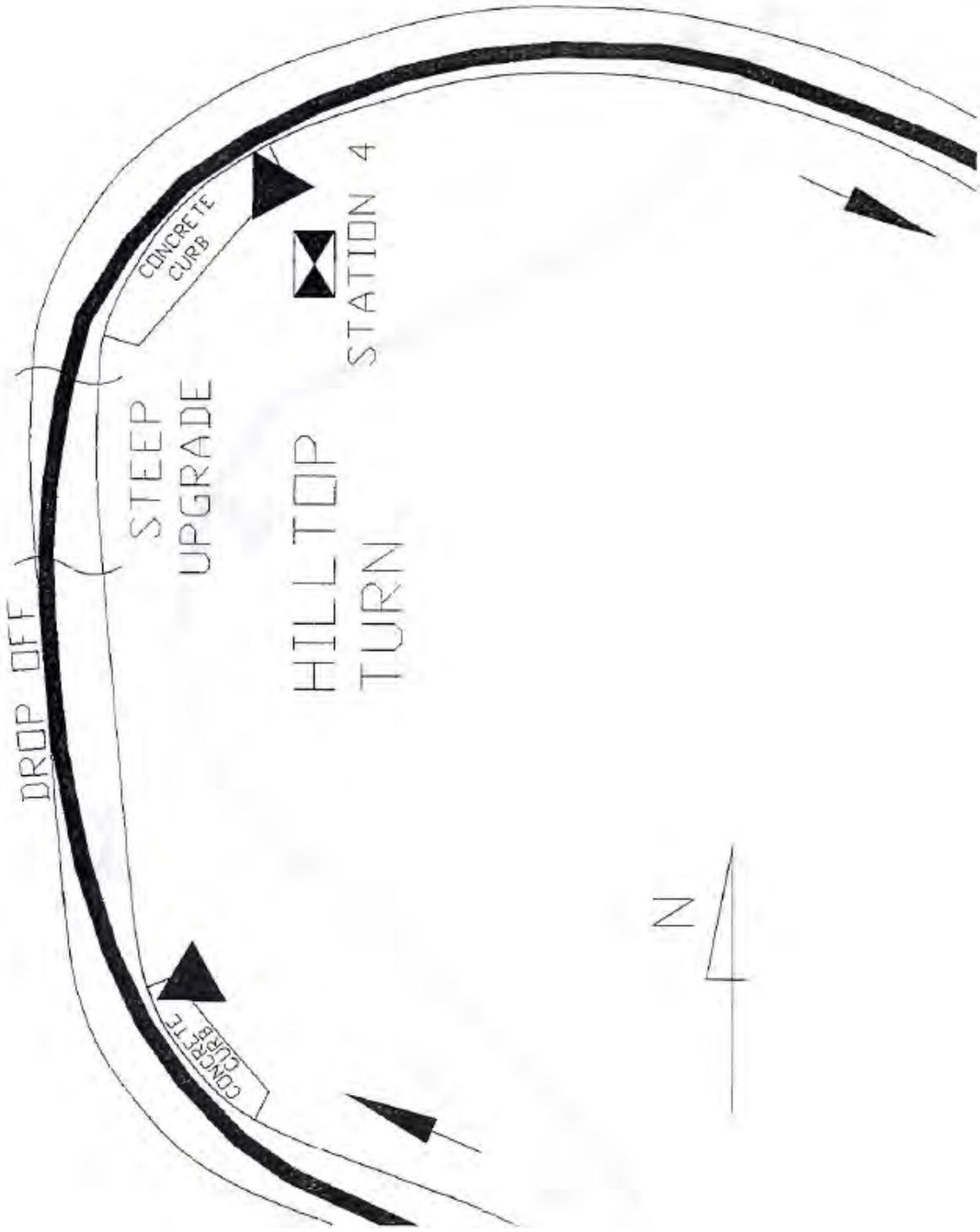


CONCRETE CURB

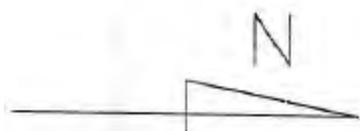
BLUFF BEND



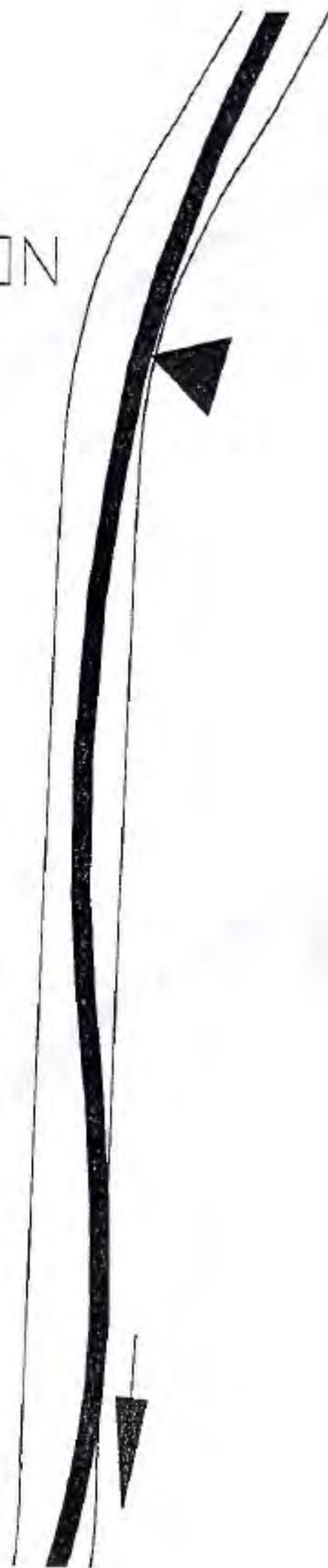


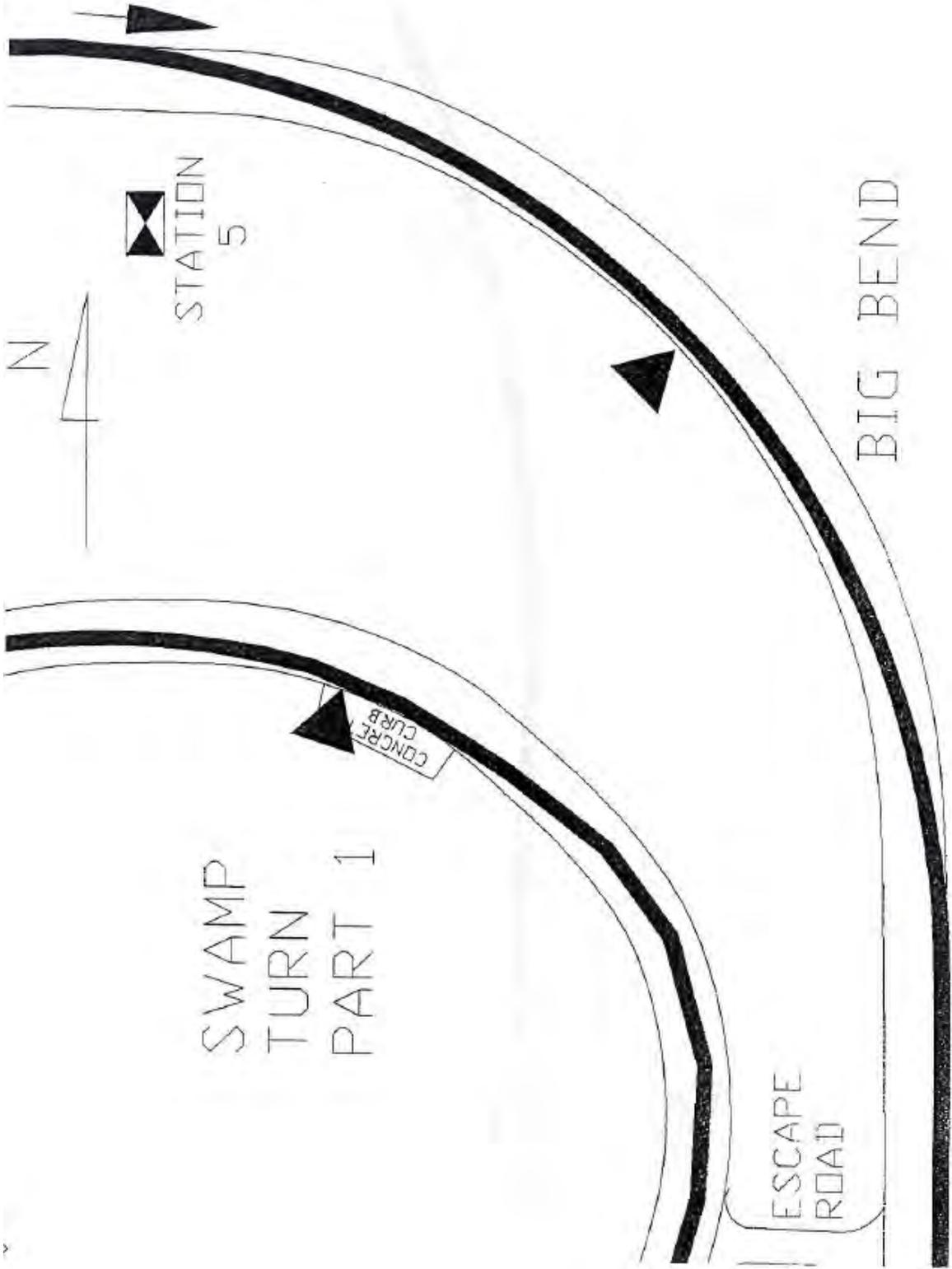


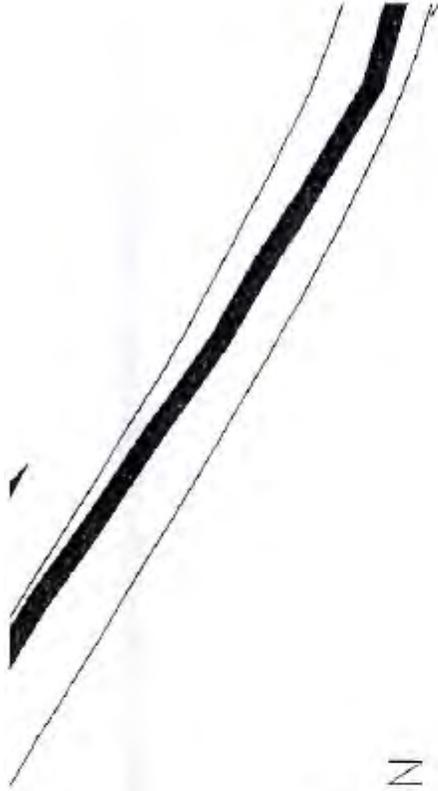
PELTON
BEND



STATION
5



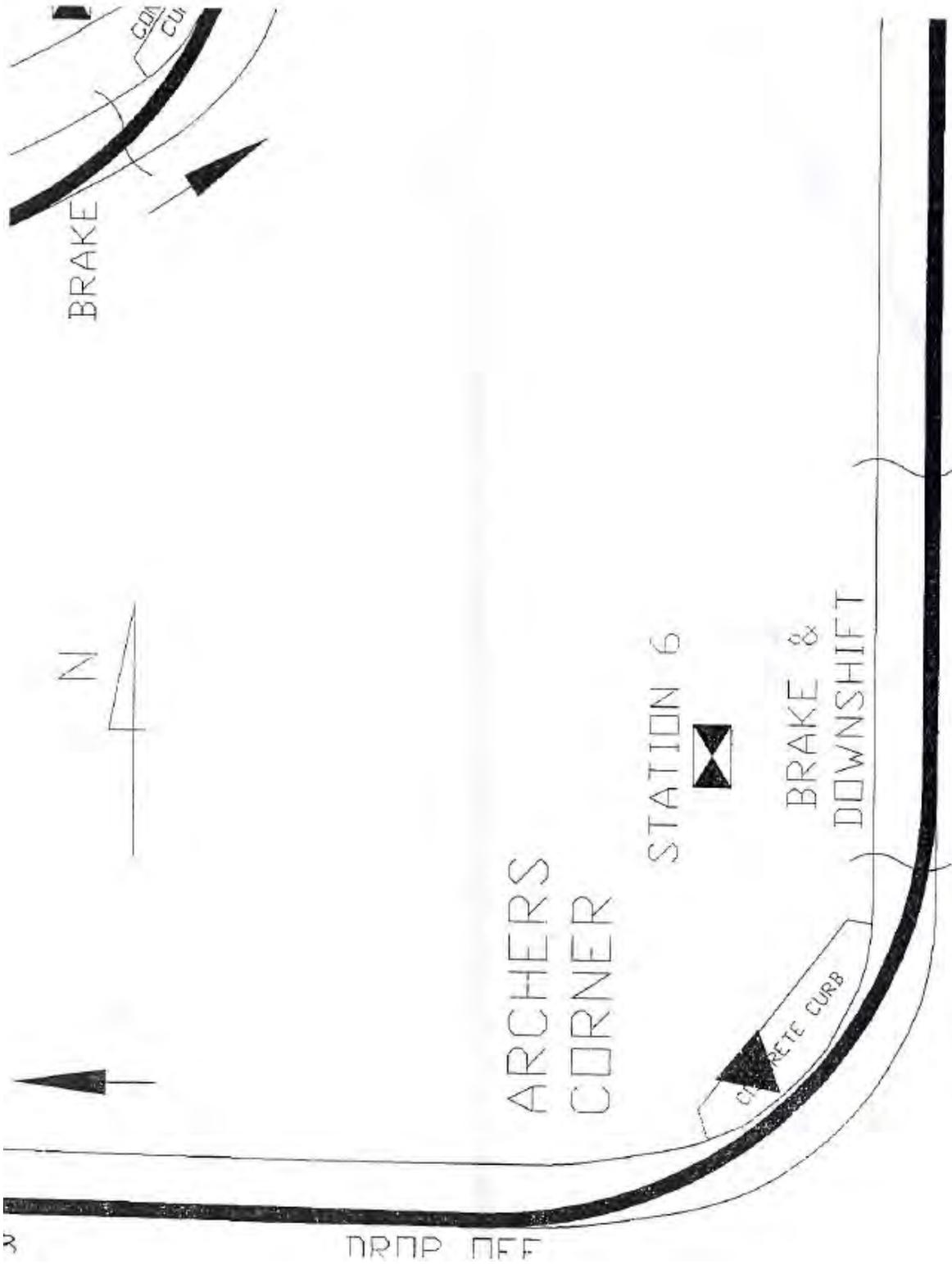


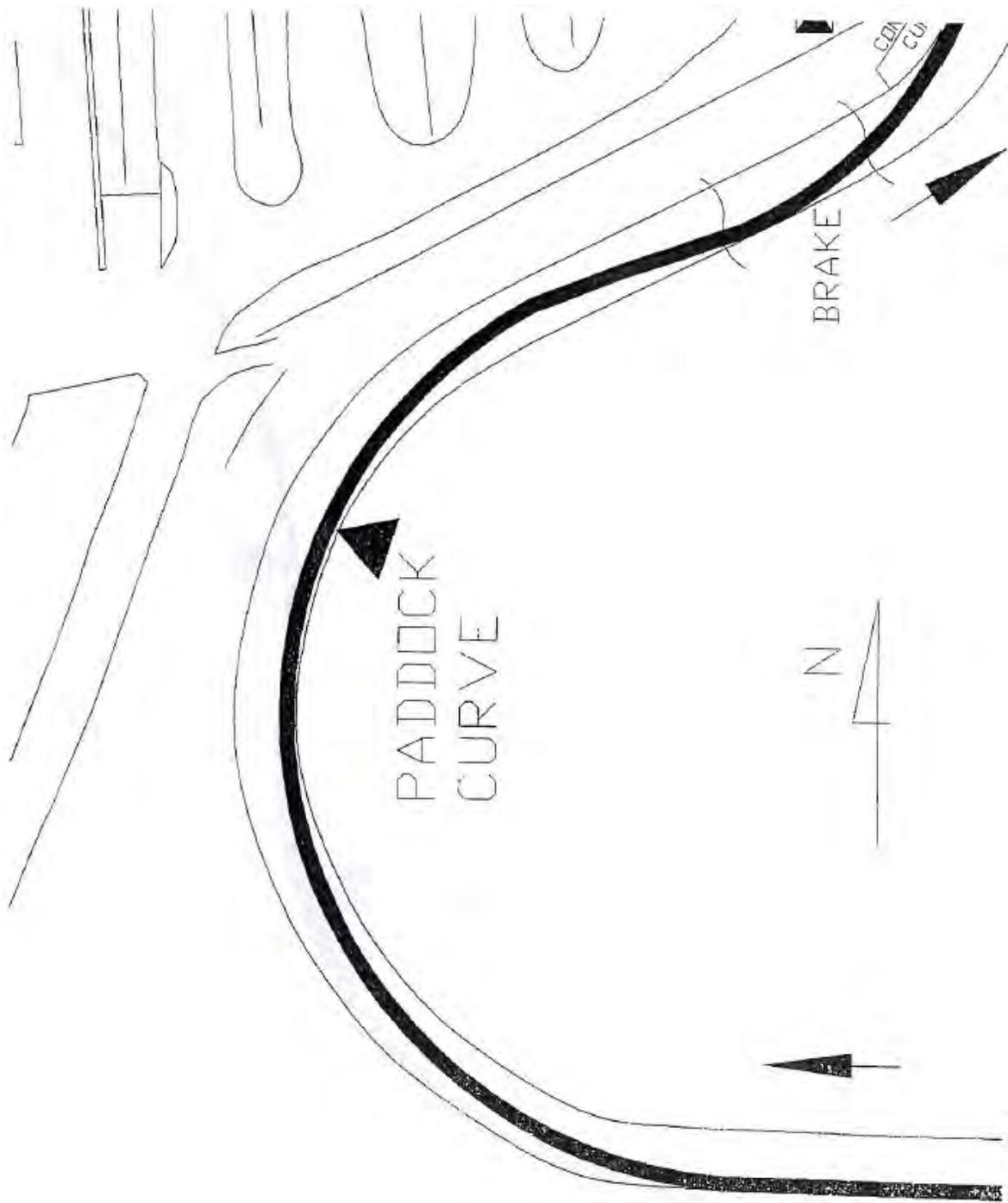


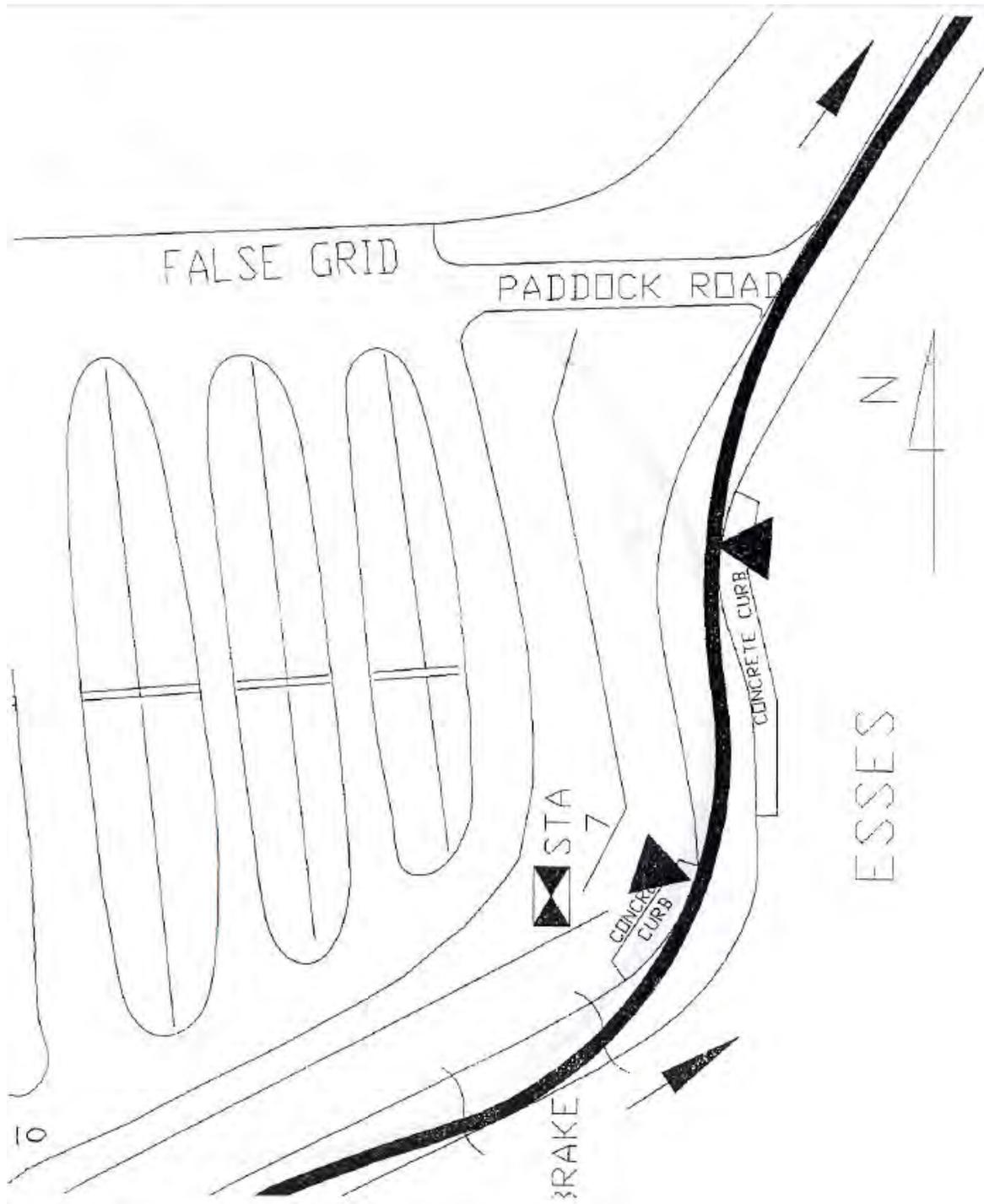
STATION
5A

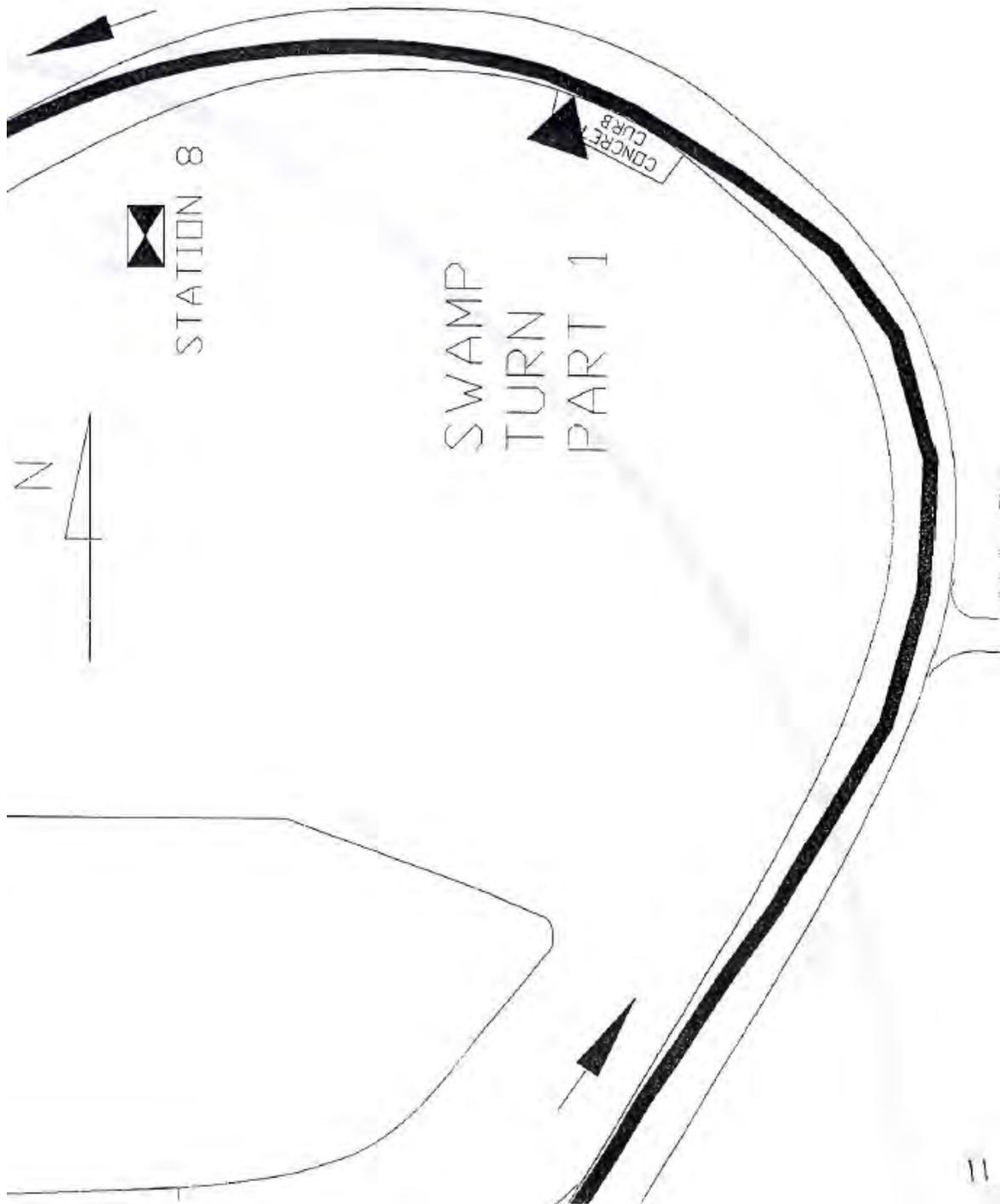
BACK STRAIGHT

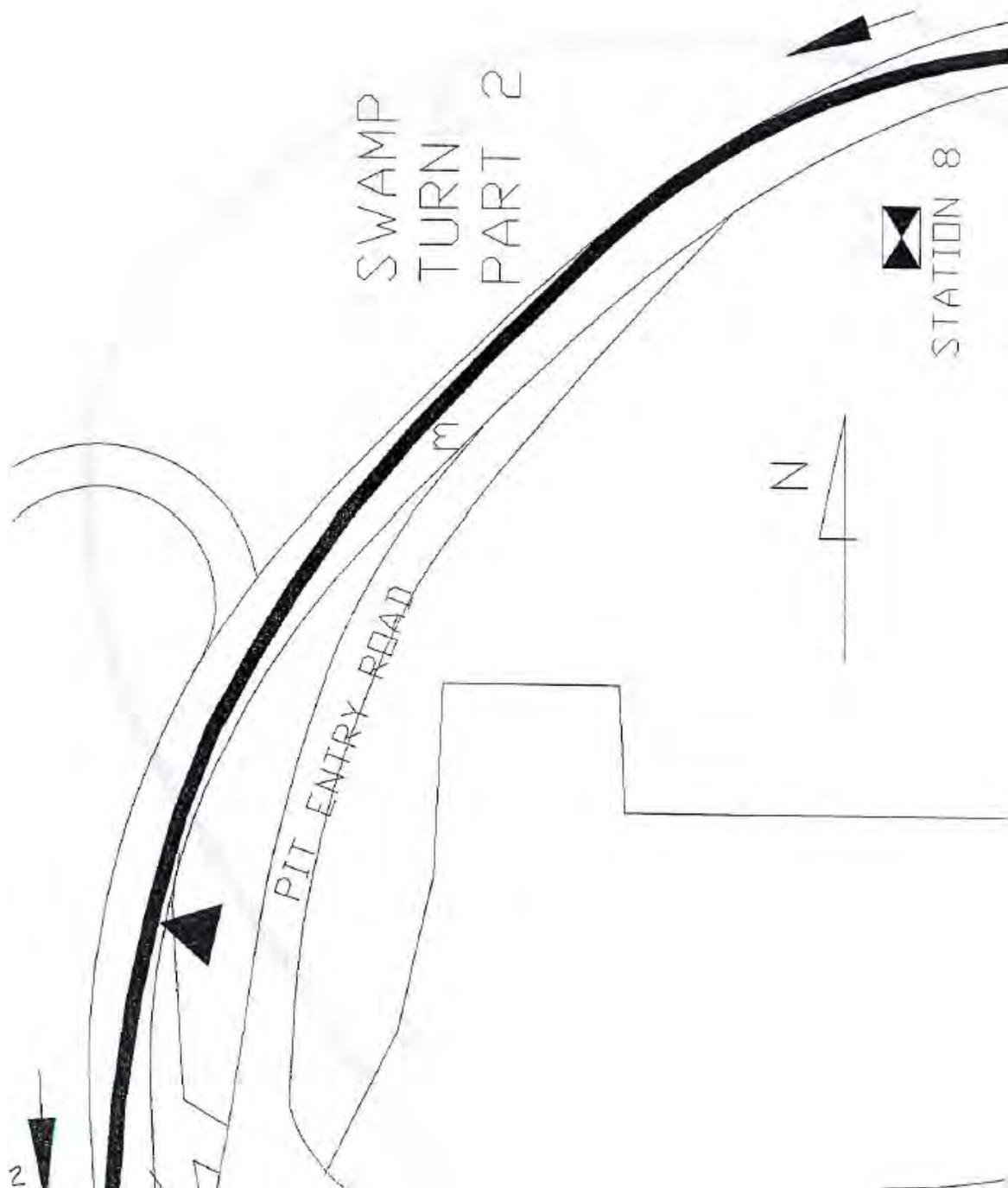






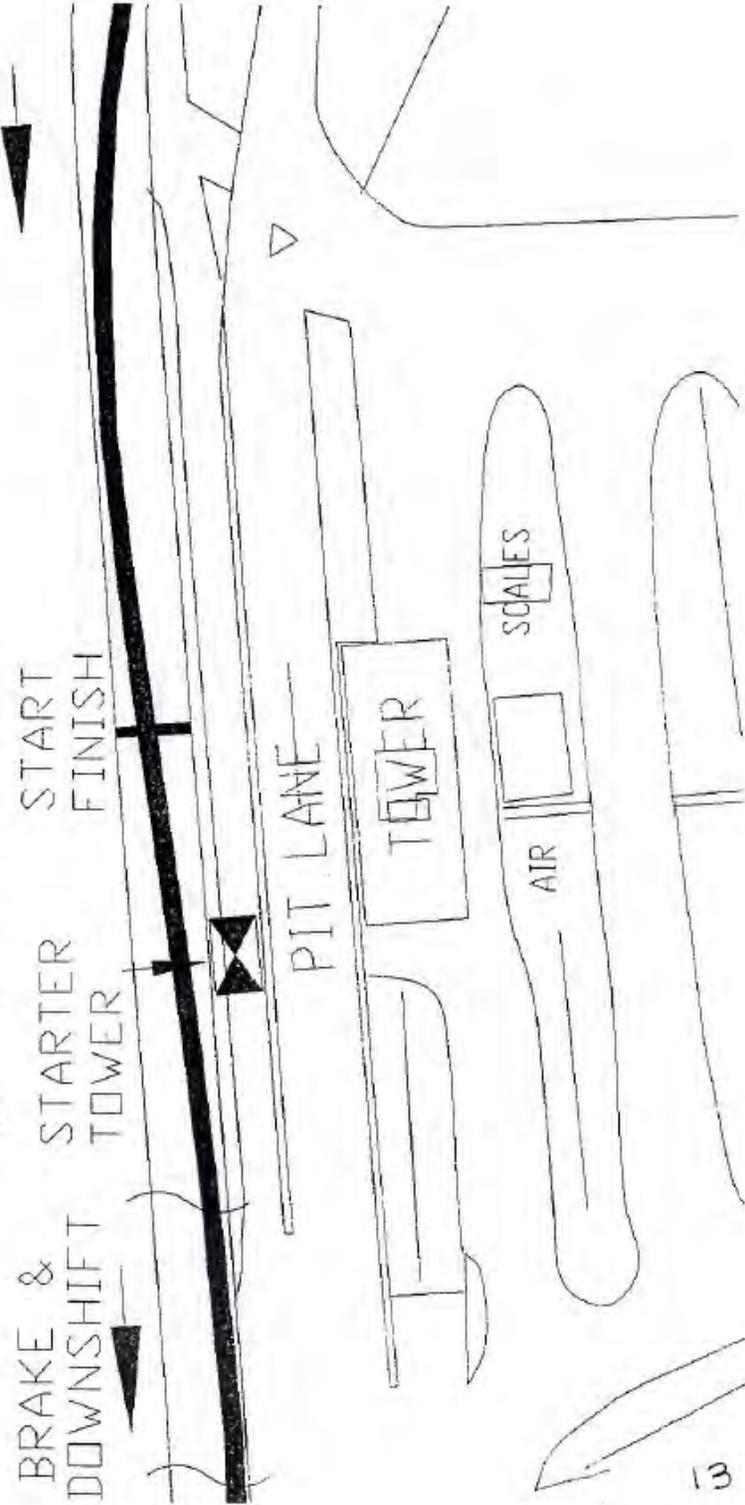


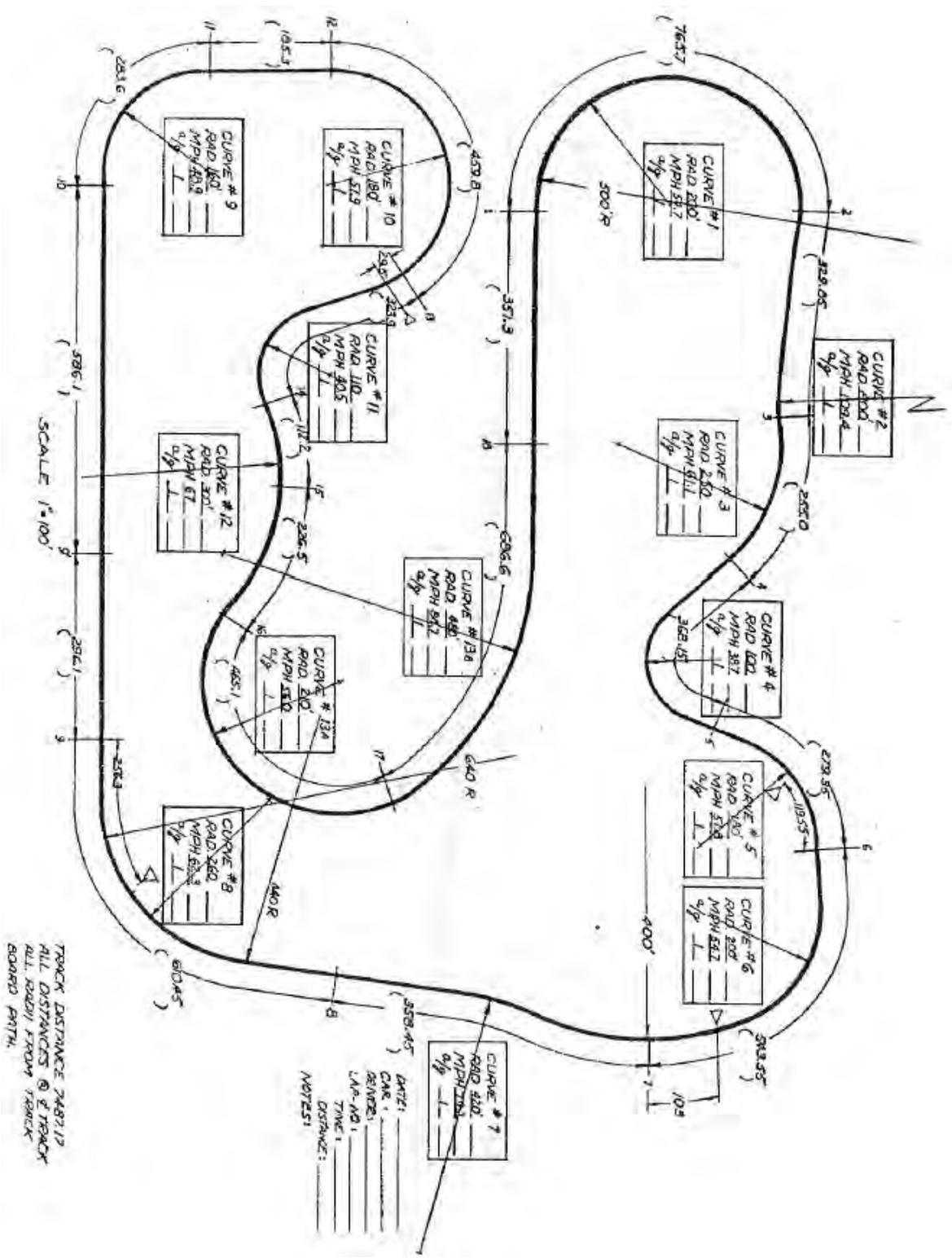




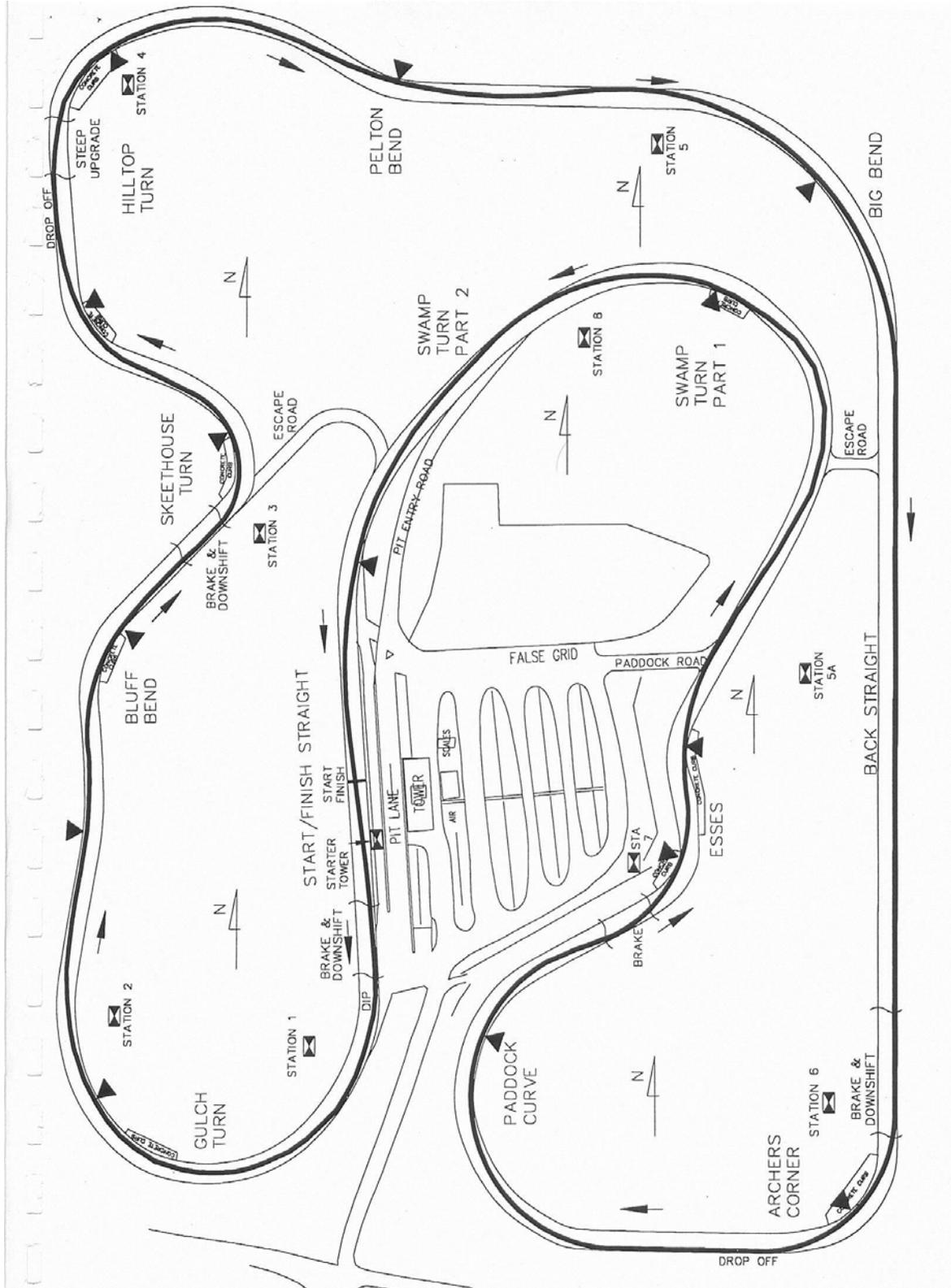


START/FINISH STRAIGHT





NOTES



NOTES

Questions?

email: OTD@WaterfordHills.com for more information