Application Procedures Guide

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The following equipment, tools and materials are necessary to apply TrafficPatternsXD:

**TrafficPatternsXD Materials**
- TrafficPatternsXD Stamping Template (3/8" / 9.5mm)
- Stamping Template Layout Drawing
- TrafficPatternsXD Thermoplastic panels
- Aggregate (50 lbs per 500 Sq Feet / 46.5 Sq Meters)
- Preformed Thermoplastic for Transverse Crosswalk Lines
- TrafficPatterns Sealer

**Layout Tools**
- Measuring Tapes / Tools
- Chalk Line
- 3/8" (9mm) Rope
- Road Marking Spray Paint
- Marking Crayons

**Heating & Stamping Equipment**
- StreetHeat SR-60 or SR-120
  - Propane
    - 2) 100lb Tanks for SR-60)
    - 3) 100lb Tanks for SR-120)
  - Umbilical Cord
  - Infrared Thermometer
  - Generator (3000 Watts)
- Thermoplastic Bridge and Bridge Feet
- SR-20/28 with Propane (Optional - For areas inaccessible to the SR-60 or SR-120 heaters)
- Approved Propane Heat Torch (Flint2000EX, Magnum, or StreetHeat Jet Heater)
- 2) 700-900lb Vibratory Plate Compactors
- Water Container / Mister / Sprayer and Water Source
- Finishing Tools
  - Hand Held Finishing Tool or 3/8” Finishing Bit
  - 2) 3-5lb hammers

**Aggregate Application Equipment**
- Spray Hopper Gun
- Air Compressor with Hoses and Fittings

**Misc. Equipment**
- Sealer Dispensing Gun
- Gas Powered Blower
- Brooms
- Cutting Blade, Utility Knife, and/or Powered Cutting Tool
- Straight Edge
- Concrete Board (Used as heat shield)
- Full Tool Kit
- Safety Gear
  - Safety Glasses
  - Dust Masks
  - Safety Vests
  - Ear Protection
  - Steel Toe Boots
- Fuel for All Equipment
- Chisel
- Second Approved Propane Heat Torch
- Second Spray Hopper Gun (SR-120 Application)
TrafficPatterns XD Thermoplastic
TrafficPatterns XD is manufactured in 2’ x 2’ panels that are sold in boxes of 10 panels (40 sq. ft. / 3.7 sq m).

TrafficPatterns XD Templates
TrafficPatterns XD requires 3/8” (9mm) wire rope templates, which are used to make brick patterns through the molten TrafficPatterns XD thermoplastic and into the asphalt. Template life is dependent on application practices and should be monitored by the applicator. Replacement templates should be purchased when required.

TrafficPatterns® Sealer
TrafficPatterns® Sealer must be used for proper material adhesion. Each TrafficPatterns® Sealer Kit contains enough sealer to cover approximately 90 sq. ft. (8.4 sq m). The TrafficPatterns Sealer Dispensing Gun is required for the sealer cartridge, and may be ordered from Flint Trading, Inc.

TrafficPatterns XD Aggregate
One 50lb bag of TrafficPatterns XD Aggregate is applied (as needed) approximately every 500 sq ft (46.5 sq m). One bag is shipped for every 500 sq ft (46.5 sq m) of TrafficPatterns XD thermoplastic. Use only TrafficPatterns XD Aggregate during the application process. No substitutions are allowed. The aggregate affects the skid resistance and color, so if a different aggregate is used, it will produce different aesthetic and performance results and will void the product warranty.

Hand Held Spray Hopper for Aggregate Application
The Graco Hand Held Spray Hopper available from Flint Trading, Inc. is used to apply the aggregate evenly (as needed) to the thermoplastic. It utilizes a special red tip that must be used for proper aggregate distribution. For the SR-120, two spray hoppers are recommended to manage the large heating area.

Transverse lines – Preformed White Thermoplastic
It is highly recommended that PreMark® preformed thermoplastic lines be applied along the sides of TrafficPatterns XD crosswalks. White PreMark® preformed thermoplastic is available in 6”, 8” and 12” (15 cm, 20 cm and 30 cm) widths and in 90 and 125 mil thicknesses. These transverse lines should conform to local regulations and may also help lessen snow plow damage to the TrafficPatterns XD material.

3/8” Hand Held Finishing Tool (HHFT) or Finishing Bit
The 3/8” HHFT is used in the post stamping stage to define the 3/8” (9 mm) thermoplastic grout lines in difficult to reach areas. The 3/8” (9 mm) finishing bit is used in the same places as the HHFT, but is mounted on a small non-rotary chipping hammer, making it less labor intensive to tie in grout lines.

StreetHeat Thermoplastic Bridge
The front of the SR-60 or the SR-120 sits in the Thermoplastic Bridge and allows the heaters to extend over the hot thermoplastic. This way the front of the heater does not come in contact with the hot thermoplastic. NOTE: There are different bridges for the SR-120 and the SR-60.
**Asphalt Pavement Conditions**
An existing high quality, highly stable asphalt pavement surface is a prerequisite for the application of the TrafficPatternsXD system. It is important that TrafficPatternsXD NOT be installed over asphalt in poor condition, as substrate defects can affect the finished product's aesthetics, as well as longevity.

- Please consult the TrafficPatternsXD Substrate Guide for more information.
- TrafficPatternsXD may not be applied to concrete substrates.

**Environmental Conditions**
TrafficPatternsXD should be installed only when the ambient temperature and the substrate temperature is 45°F / 7°C and rising and no precipitation is expected. The ground should not have any frost or moisture present. Be cautious if high winds are expected as this will affect the “effective heating area” of the StreetHeat Heaters.

**Cleaning**
Before beginning work, ensure the surface is cleaned appropriately. Surfaces that have recently received de-icing chemicals, or containing excess amounts of “ground in” debris may need to be pressure washed the day before application. Areas that have a minimal amount of dirt and debris will need to be cleaned thoroughly using a gas powered blower and a heavy bristled broom.

**Layout**
Proper layout is a crucial part of the TrafficPatternsXD application. Layout determines the proper placement of material and aids in the alignment of the template during the stamping step.

Use 3/8” rope, road marking paint and your chosen pattern template to center your project.

Using your center line, mark the perimeter of the project using rope or the template to determine the limits of the thermoplastic material placement (red solid lines). The more lines you make, the easier it will be to keep the placement of material straight.

If the perimeter is not going to be lined with preformed thermoplastic, paint should be avoided and chalk lines should be used, as the paint will be seen after the project is completed.

You should also create template alignment lines that extend outside of the thermoplastic area using chalk lines in the areas that will not be covered with material (blue dotted lines). These lines will be used during the stamping step to ensure proper alignment of the template, and to keep the grout lines straight. Make as many of these lines as you think are needed.

**Moisture Removal  ****Very Important****
Allow the StreetHeat heater to cycle over the area 2-3 times to remove any surface moisture that may be present. Ensure the asphalt substrate is completely dry.
TrafficPatterns® Sealer Application

TrafficPatterns Sealer must be applied to the substrate prior to the TrafficPatternsXD thermoplastic material to ensure proper adhesion. The sealer is heat activated and when fully cured improves the bond between the material and the pavement surface.

Each TrafficPatterns Sealer Kit contains enough sealer to cover approximately 90 sq ft (45 sq ft per cartridge). The TrafficPatterns Sealer Dispensing Gun is required for the sealer cartridge, and may be ordered from Flint Trading, Inc.

Follow the application instructions below after the layout has been completed. Always wear eye protection and the included blue nitrile gloves to avoid any sealer contact.

- With the cartridge pointing upward, remove cartridge cap and screw on the mixing nozzle.
- Inset cartridge into dispensing gun.
- Squeeze out a small amount of sealer into the supplied tray until the two parts are mixing evenly.
- Only apply sealer to areas you will be heating within 20 minutes. If sealer is allowed to cure before the material is placed over it and heated, it will not function properly.
- Apply the sealer evenly over the surface and roll out to give a consistent thin layer being sure that the sealer does not pool in any low spots.
- Be sure not to apply sealer outside your marked area, as it will discolor the substrate.
- If sealer should cure on the asphalt surface, simply reapply it.
- Place material over all sealed areas and immediately begin heating with the StreetHeat Heater. (Refer to Heating/Melting Process text for proper procedure.)

Notes

- Please consult the TrafficPatterns Sealer Application Instructions included with the sealer kit for more information on proper sealer application.
- For obstacles and curbs, it is best to make the necessary cuts to the material before applying sealer to that area to avoid having a mess.
- Roller covers have a very short life span and should be replaced frequently.
- Replace used mixing nozzle if it has been allowed to sit with sealer in it for a length of time.
- Sealer has a 12 month shelf life.
- Contact Flint Trading, Inc. for further information on proper TrafficPatterns® Sealer application.
TrafficPatternsXD Thermoplastic Placement
The thermoplastic is manufactured in panels measuring 2 ft. x 2 ft. [±⅛ in.] (0.61m x 0.61m [±3mm]).

Place the thermoplastic with the aggregate side facing up in the layout area centering the edge of the thermoplastic in the middle of the layout/grout lines. Try to use only one side of your crosswalk layout lines to start placing material so the alignment is consistent and straight. Thermoplastic panels should have no more than 1/8” gap between them.

Create as many new layout lines as needed to ensure proper placement.

TrafficPatternsXD Thermoplastic Placement: Cutting Around Obstacles and Borders
There are often various obstacles that can interrupt the TrafficPatterns XD pattern, such as manholes, drains, utility covers and curbs. When working into odd angles and around obstacles, use a heavy duty utility knife or tin snips to score and cut the thermoplastic. You may also use a small circular saw or cutting tool with an abrasive cutting blade to cut the material. The thermoplastic material will be brittle in cooler conditions, so care should be taken when cutting. Adding a little heat to the area to be cut will help make the material more pliable for cutting.

• When cutting, please take care to avoid personal injury, and be sure to wear appropriate personal protective equipment.

StreetHeat Heater Pilot Light Adjustment
Before heating the TrafficPatternsXD material, it is advisable to adjust the pilot lights on the StreetHeat heater down as much as possible so that they remain lit, but are not turned up so much that they scorch the TrafficPatternsXD thermoplastic material directly beneath them.
**Heating/Melting Process**

Proper melting of the thermoplastic panels is vital to the TrafficPatternsXD application process. Using the StreetHeat heating equipment allows the heat to penetrate through the thermoplastic and into the asphalt surface. The thermoplastic surface should be heated to 350-400°F / 175-205°C and maintained between 350-375°F / 175-190°C for an extended length of time; until the material has achieved a fully molten state throughout. The seams between the material panels must completely fuse together to give one consistent sheet of molten thermoplastic.

Once the panels are molten and fused together, bond to the substrate must be physically verified using a chisel, putty knife or screwdriver to confirm proper material adhesion. Asphalt should be present on the underside of the material as shown to the right.

Please consult the next page, “Achieving Proper Adhesion” for more information.

Melting requires constant attention to prevent the material from burning or discoloring. Sustained temperatures in excess of 420°F / 215°C should be avoided as the material could burn and cause discoloration. The amount of heat needed, material flow, and temperatures will vary depending upon ambient environmental conditions.

**Adhesion MUST be confirmed by physically checking the underside of the material for asphalt.**

You can protect areas that have already been applied by using concrete board (such as Hardie board or Durarock). The concrete board will act as an insulator against the direct heat coming from the heating equipment. Be aware there are limits to how much heat against which the boards can protect. Constantly misting the boards with water will help keep them cool and reduce heat transfer. The boards will dry out and become very brittle with use, so make sure you have enough on hand to protect all areas that require protection.

Always mark your heater location, as this will define your heating area. This is important when determining the placement of the thermoplastic bridge for the next heating cycle.

**WARNING!** Hot thermoplastic can cause 3rd degree burns. It will stick to anything to which it comes in contact. Do not let anything come in contact with TrafficPatterns XD thermoplastic during the melting stage. Always check materials with an IR thermometer to ensure it has properly cooled.

As a safety precaution, always have a bucket of clean water available in case of emergency. Placing burns immediately in water will reduce severity.
Inspect the recently applied TrafficPatternsXD to ensure that complete bonding has occurred over the entire area. After the material has cooled to near ambient temperature, use a putty knife or chisel and attempt to remove a portion of the material along an edge. Edges should be rounded and thoroughly bonded. If properly applied, the material should pull away from itself, leaving a residual film on the surface. Depending upon the condition of the surface, some asphalt may also be adhered to the underside of the TrafficPatternsXD material. If the material does not pull away from the surface without any material remaining on the substrate, reposition the material and reheat that portion of the marking. Once the bond has been verified, use the TrafficPatterns Sealer to adhere the sample piece of material back to the surface.

When applied correctly, the TrafficPatternsXD should appear as one continuous marking. All seams should be closed. There should be no gaps between adjacent segments. Do not begin applying the next row of TrafficPatternsXD material until a sufficient bond has been established. While material can be reheated to achieve adequate bond at the time of application, attempts to reheat material the following day will be unsuccessful.

Note: Material will not bond with the pavement until the sealer cures. Since the sealer will take longer to cure in cooler temperatures, (45-55°F / 7-13°C), you should allow for more time to elapse before checking bond than you normally would when applying in warmer temperatures. Thereafter, you can check the bond at 15 minute intervals. Sealer should cure within an hour at the temperature range noted above.

When proper adhesion has been verified, immediately apply the aggregate to any areas on the material surface where the factory applied anti-skid/anti-slip elements have embedded too deeply into the molten thermoplastic material. Refer to Aggregate Application text on next page for proper procedure.

**Adhesion Warning**

Poor adhesion is the number one cause of failure. Adhesion failure occurs during application and is up to the Applicator to prevent. Make sure that thermoplastic is properly bonded and that necessary heating area overlaps are made with the SR equipment being used.

Top factors that cause adhesion failure:

1. **Lack of heat**: Material must be fully molten in order to stick. Make sure that any material seams and overlaps disappear when molten and check to ensure this happens.
2. **Not understanding effective heating area**: Your heating area is reduced when melting TrafficPatternsXD thermoplastic. When melting thermoplastic, the front of the SR equipment should be placed 18 inches/ 46 cm past the area to be melted. Always do a physical check where material overlaps, where StreetHeat bridge is placed, and on the edges.
3. **Moisture**: Thermoplastic will not bond to wet asphalt. Therefore, the asphalt must be moisture free before placing TrafficPatternsXD thermoplastic. Always heat asphalt before placing material to ensure no moisture is present.
4. **Dirt**: Surface must be free of dirt and debris for thermoplastic to bond. Always use a blower and a broom to clean the HMA surface before placing TrafficPatterns XD thermoplastic panels.
5. **Application over cured sealer**: The TrafficPatternsXD thermoplastic must be applied while sealer is still wet. If sealer cures before application, simply reapply a fresh coat to the substrate, position and heat the material.
TrafficPatternsXD Aggregate Application

TrafficPatternsXD is supplied with anti-skid/anti-slip elements in the material intermix and factory applied to the surface. However, during the heating process, some of the factory applied anti-skid/anti-slip elements may embed too deeply into the molten thermoplastic material requiring additional aggregate to be applied during application. (Any embedded aggregate is exposed upon wear for extended skid resistance.)

TrafficPatternsXD Aggregate should be applied to fully molten thermoplastic material in areas where the factory applied anti-skid/anti-slip elements have embedded too deeply into the surface of the material during the heating process to ensure even skid/slip resistance across the surface of the material. Even surface coverage will also prevent the template from sticking to the surface during the stamping stage. Finally, it is important aesthetically to have even surface coverage for a consistent surface texture and color.

Once you have confirmed adhesion and the material is still molten (350°F/175°C), apply aggregate to areas where it’s needed to ensure even surface coverage. The aggregate may be applied until the material cools and will no longer accept it. There should be an even, thin layer of aggregate on the surface with little to no exposed thermoplastic. More aggregate may be required where the heating areas overlap as the material in these areas will likely have received more heat.

If the aggregate is not applied when the thermoplastic is in a molten state, it will not adhere to the surface. This may result in locations with poor skid resistance, shininess, or color variations.

PROPER PERSONAL PROTECTION EQUIPMENT, SUCH AS A DUST MASK AND EYE PROTECTION MUST BE WORN WHILE SPRAYING AGGREGATE AND STAMPING THE TEMPLATE INTO THE THERMOPLASTIC.
**TrafficPatternsXD Stamping**

Once the TrafficPatternsXD thermoplastic has cooled, the surface must be stamped to define the grout lines. The surface needs to be stable enough to walk on and support the plate compactor, yet soft enough to accept the template. Stamping temperatures will vary dependent on ambient temperatures, size of plate compactor, and the age of the asphalt substrate, but should generally be between 160-170°F / 72-77°C.

Once the surface has cooled appropriately, place the template over the thermoplastic material using the layout lines made earlier to properly align the template. Stamp the material using your vibratory plate compactor. Make sure that any excess build up of surface aggregate has been blown away from the surface. Ensure that the whole template is stamped and is flush with the surface so that the grout lines throughout the area are clearly defined and consistent. Once the template has been fully stamped into the surface, remove the template to inspect impressions. Use the 3/8” XD Hand Held Finishing Tool or Bit on any shallow areas, or to tie in different patterns, while the material is still warm.

Using your finishing tools, create a grout line at the curb or any other location where the material meets concrete or steel obstacles. This will provide an expansion point and limit material chipping along the edge.

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**There is a balance in stamping temperatures:**

- **If the surface is too hot:** The thermoplastic can be pushed up and over the template, making it difficult to remove and potentially causing adhesion issues. It can also create excessive marks on the surface from the plate compactor.

- **If the surface is too cold:** The force from the plate compactor can cause premature wear of templates and the plate compactor itself.

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**To help prevent damage from the plate compactor:**

If your plate compactor leaks oil or leaves a residue behind on the thermoplastic surface, you may use thick plastic vapor barrier sheeting under the template during the stamping process. However, adherence to stamping temperatures is still crucial. (The thin plastic sheets included in the material packaging should not be used for this purpose.)
Transverse Thermoplastic Lines

For application of regulatory crosswalk boundary lines, white, retroreflective preformed thermoplastic should be placed along the sides of the TrafficPatternsXD crosswalk before opening to traffic. This allows for uniform performance and appearance. In regions with harsh winter environments, the lines may also act as a “ramp” to help lessen damage to the TrafficPatternsXD material that may be associated with aggressive snow plowing. PreMark® Preformed Thermoplastic is available from Flint Trading, Inc. and is easily installed using the SR-20, SR-28, or an approved hand held torch.

The preformed thermoplastic lines should be applied after the TrafficPatternsXD application process is complete. Do not attempt to apply the preformed thermoplastic lines during the TrafficPatternsXD application process.

PreMark® preformed thermoplastic crosswalk line basic application procedure:

1. Ensure surface is clean and moisture free. Heat the surface with a torch or SR-20/28 to remove any moisture that may be present, but it is not necessary to preheat the substrate to a specific temperature before applying PreMark® preformed thermoplastic.
2. Align the preformed thermoplastic lines along the sides of the TrafficPatternsXD at the grout line. Be sure to place them end to end to produce a straight white line.
3. Reciprocate the SR-20/28 to melt the thermoplastic lines in place. Make sure seams disappear as the thermoplastic becomes molten and flows together. Use an approved propane heat torch to melt areas that the SR-20/28 cannot reach.
4. Verify bond using the chisel test as outlined in the application instructions.

Please consult the PreMark® Application Instructions provided in each package for complete instructions. Contact Flint Trading, Inc. at 336-475-6600 with any questions.

Please consult the FHWA MUTCD for more information on proper crosswalk demarcation.

Notes:

- PreMark® does not require sealer on newer asphalt; however old, worn or heavily aggregated asphalt may require a sealer. (See complete application instructions in each package of material for more information.)
- Depending upon the ambient and substrate temperatures, limit the heat stroke to 7–12 feet (2.1-3.6 meters) long for best productivity.
- The ultimate goal is 100% adhesion of the thermoplastic to the asphalt surface.
- Ensure that care is taken to not burn the transverse lines or the TrafficPatternsXD thermoplastic.
- Replace any surface aggregate on the TrafficPatternsXD material that may be fallen below the surface while applying the transverse lines.
- Redefine any grout lines that are affected with one of the finishing tools.

Opening To Traffic

Traffic may be introduced to the completed TrafficPatternsXD crosswalk once it and the preformed thermoplastic lines reach surrounding asphalt substrate temperatures.

Water can be used to cool the TrafficPatternsXD and the preformed thermoplastic line surfaces, once the temperature is below 150°F (65°C). Usually, traffic can be introduced 30 minutes to an hour after completion.
Effective Heating Area and Option for Complex Designs

Understanding the Effective Heating Area of the StreetHeat Heaters

The key to proper melting (and bonding) of TrafficPatternsXD thermoplastic to the asphalt substrate is understanding the effective heating area of the SR equipment being used.

The thermoplastic needs to be heated to a specific temperature for an extended length of time in order to melt properly. Temperature discrepancies at the front and back of the carriage stroke often lead to adhesion failure due to cool spots.

Understand that the effective heating area will be smaller than the carriage stroke and overlapping of heating areas may be required. Placing marks on the ground to outline your heating area will assist in proper placement of the StreetHeat equipment. Overlapping the heating areas will ensure that the thermoplastic gets the full heat exposure necessary for proper adhesion. The amount of overlap may vary slightly, dependent on ambient temperatures, but in general:

**Front and back:** Cool spots can be a full bank of heaters; up to 18 inches / 46 cm
- **Overlap 12-18 inches / 30-46 cm.**

**Side to side:** Cool spots can be up to 3 inches / 8 cm
- **Overlap 1-3 inches / 3-8 cm.**

- When using the SR-60, two “cold seams” will be evident where the heaters join at the pilot lights. Moving the SR-60 3” / 8cm to the side will ensure the whole area has even heat applied for proper adhesion.

**Note:** It is advisable to adjust the pilot lights on the StreetHeat® heater down as much as possible so that they remain lit, but are not turned up so much that they scorch the TrafficPatternsXD thermoplastic material directly beneath them.

**OPTIONAL - Creating an Initial 3/8” Stamp For Complex Projects**

For more complex designs where border placement must be exact or when two or more patterns or colors are being used, an initial 3/8” stamp (prior to applying TrafficPatternsXD thermoplastic material) can help keep patterns straight and limit color bleed. The entire project could be stamped out, or only certain key locations where different patterns or colors meet (like the arches and borders in the picture for example).

Be sure the asphalt is clean and dry after the stamping is complete.

Use good judgment when determining the need for initial stamping on your project, as it will affect productivity, but could aid in the aesthetics of the project.

If the substrate is stamped prior to application, a thick napped roller (not included in the sealer kit) will be required for sealer application.
**Safety**

**Traffic**
TrafficPatternsXD will most often be placed in the roadway. Always ensure proper traffic safety measures are in place. The proper use of flaggers, cones and signs will help keep crewmembers safe.

**Hot Materials**
During the TrafficPatternsXD process, there are many potential ways for a crew member to be severely burned. Any skin contact with infrared heaters on the StreetHeat equipment should be avoided. TrafficPatternsXD thermoplastic is heated to a molten state that can severely burn someone if they fall in or come in contact with it while it is hot (molten). Care should be taken to prevent any possible injury. Always ensure that the work area is organized and clean to avoid trip hazards that could cause someone to fall into the heating equipment or molten thermoplastic. Gloves should be worn during application and it is highly recommended to have access to clean water on-site, in the event of an accident.

**Ear Protection**
The use of plate compactors creates extremely loud working conditions. The use of ear protection is recommended when the plate compactor is in use.

**Eye Protection**
It is always recommended to wear proper eye protection, while on any job site. This is especially important during sand application.

**Dust Masks**
Dust masks should be worn by the operator and those in the area while the aggregate is being sprayed on the TrafficPatternsXD surface and while the vibratory plate compactor is in use, to prevent the inhalation of any dust created during these steps.

**Steel Toe Boots**
Steel Toe Boots may prevent injury from the use of the vibratory plate compactor, or other job site hazards.

*Flint Trading, Inc. is not responsible for any damage, loss or personal injury that may take place on a job site or as a result of the practices used during material application. The information above is presented solely as cautionary items for consideration, and may not include all necessary safety precautions or equipment. The liability for job site conditions and work practices shall fall solely on the applicator on a project or job site.*