

ASBA  2024

ASBA TECHNICAL MEETING & TRADE SHOW
DECEMBER 3-6, 2024 | ORLANDO, FLORIDA

Post-Tension Concrete Running Tracks

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What is Post-Tension Concrete?

- Post tension concrete is concrete reinforced with steel cables. The steel cables are stressed to the required force **AFTER** the concrete has been placed.
- Post tension slabs are self-sufficient and do not rely on the ground or structure they sit on to maintain their structural integrity.



How does a running track differ from a tennis court?

- Tennis court construction with PT concrete became common long before it was an accepted method of building running tracks. The reason was the shape of the slab. A tennis court is rectangular and therefore the layout of cables and stressing was self-evident. The cables are laid in a grid and stressed from a minimum of two sides.
- With running tracks, the curved ends of the slab presented a problem in cable layout and stressing. Different methods have been used to address this issue. Post-tensioned concrete track bases are going in regularly across parts of the country so our purpose is now to discuss the why, where and when they can be used.



Post-Tension VS. Asphalt

Asphalt

Pros:

- Faster Installation
- Typically less initial cost depending on distances to batch plants, quarries, and subbase remediation issues.

Cons:

- Does not hold up as long as the track surfaces.
- Costly annual repairs typically following the 5 year mark
- Less planarity control
- Long term maintenance costs
- Short life cycle



Post-Tension VS. Asphalt

Asphalt Cons Continued...



Life cycle:

- National Asphalt Paving Institute gives the life cycle of asphalt to be 16 - 18 years at which time a remove and replace or a mill and pave will be required. This does not take into account interim maintenance such as crack sealing.
- NAPA life-cycle is predicated on vehicular traffic continuously kneading the asphalt together. On substrates with no vehicular traffic, the asphalt is more susceptible to environmental damage.

Reflective Cracking

- Structural cracking will develop over time. These will reflect through the surface.
- When surfacing or resurfacing over asphalt substrates with cracks evident, crack filling will be effective only over the short term before they re-open on the surface

Planarity

- Asphalt planarity is contingent upon the planarity of the subgrade fine grading. Deviations in the base course will typically show in the paved mat.
- When paving a track in multiple passes, it is critical that each pass remains in the same plane – often pavers will pave the inside pass too high and have to adjust the outer pass to meet the outer curb, creating a grade break within the track

Shifting

- Asphalt has little tensile strength making it susceptible to cracking from expansion/contraction over several cycles, more prevalent over time as the asphalt turns brittle.
- Asphalt is a pliable surface, which will follow contours of the subgrade. Should settling or heaving occur in the subgrade, asphalt will reflect this.

Post-Tension VS. Asphalt

Post-Tension Concrete

Pros:

- Ability to span unstable soils without major sub-base preparation
- Resistant to settling and/or heaving
- Planarity more easily controlled
- Not effected by the breathing of the soils like asphalt
- Eliminates the liability of structural cracking
- Acts as anchor for artificial fields
- Ability to reconstruct over existing asphalt without any major excavation or transporting of material
- Greatest longevity
- Placed with no control joints or expansion joints

Cons:

- Most expensive substrate option
- Requires clear access around facility for concrete placement.



Post-Tension VS. Asphalt

Post-Tension Concrete Pros Continued

Asphalt availability

- In some locales asphalt plants are many miles away whereas concrete plants may be closer. Trucking costs potentially bring asphalt costs close to concrete costs.
- Long travel times equate to cooling asphalt, which can compromise the integrity of the paved mat, as well as reduce the longevity.
- Properly constructed asphalt substrates should be placed in 2 lifts; costs approach concrete at this point

Installation over Existing

- Can be cast as an overlay on existing substrate, providing existing substrate is stable and does not show differential displacement
- Demo cost savings. No need to even remove existing track surface
- More expedient installation eliminating demolition
- New substrate will be higher than existing – provisions will need to be made for this transition
- If there is an existing turf field and channel drain there is no need to remove existing channel drain when replacing track and D-zones.



Post-Tension VS. Asphalt

Post-Tension Concrete Pros Continued

Life Cycle

- Concrete structures are designed for a minimum 50 year life cycle.
- Provides a sub-surface to last through several surface remove and replacements.
- Expensive up front but over several years it pays for itself

Anchor for Synthetic Turf Fields

- Provides an integral curb with turned-down edge, eliminating need for separate curbing and associated joint between track and curb.

Faster and more cost effective Synthetic Turf Installation



EVALUATION OF SITE AND PROJECT FOR DESIRABILITY OF POST-TENSIONED TRACK CONSTRUCTION

- New construction or replacement
 - New construction- general evaluation of site as for any track including access, size, and configuration. Very much the same as for an asphalt based track
 - What are the elevations and drainage of the site?
 - Are there soils and weather considerations at the site?
 - Does the owner report expansive soils or ground water in the area?
 - Are there contaminated soils under the existing track?
 - Post tensioned concrete would be strongly recommended with these types of site conditions.



EVALUATION OF SITE AND PROJECT FOR DESIRABILITY OF POST-TENSIONED TRACK CONSTRUCTION

- Project expectations and funding.
 - Is this project a long-term investment for the District? If not, will there be funds available in future years to replace the base?
 - Many of the post-tensioned concrete tracks have been installed not because of site problems but because they provide the “forever” track base. The base will last an extremely long time and allow for repeated surfaces to be installed without replacing or repairing the base.
 - Post-tensioned concrete may be the only long term answer in some soils conditions. There have been pt tracks installed in areas where all other methods of stabilizing the soils have repeatedly failed.
 - Even with relatively good soils, the longevity of concrete vs asphalt is a consideration

