

3-D Stratigraphic Correlation of Shallow, Densely Spaced Cores from the Jurassic Lower Portland Formation in the Hartford Basin (Hartford, CT)

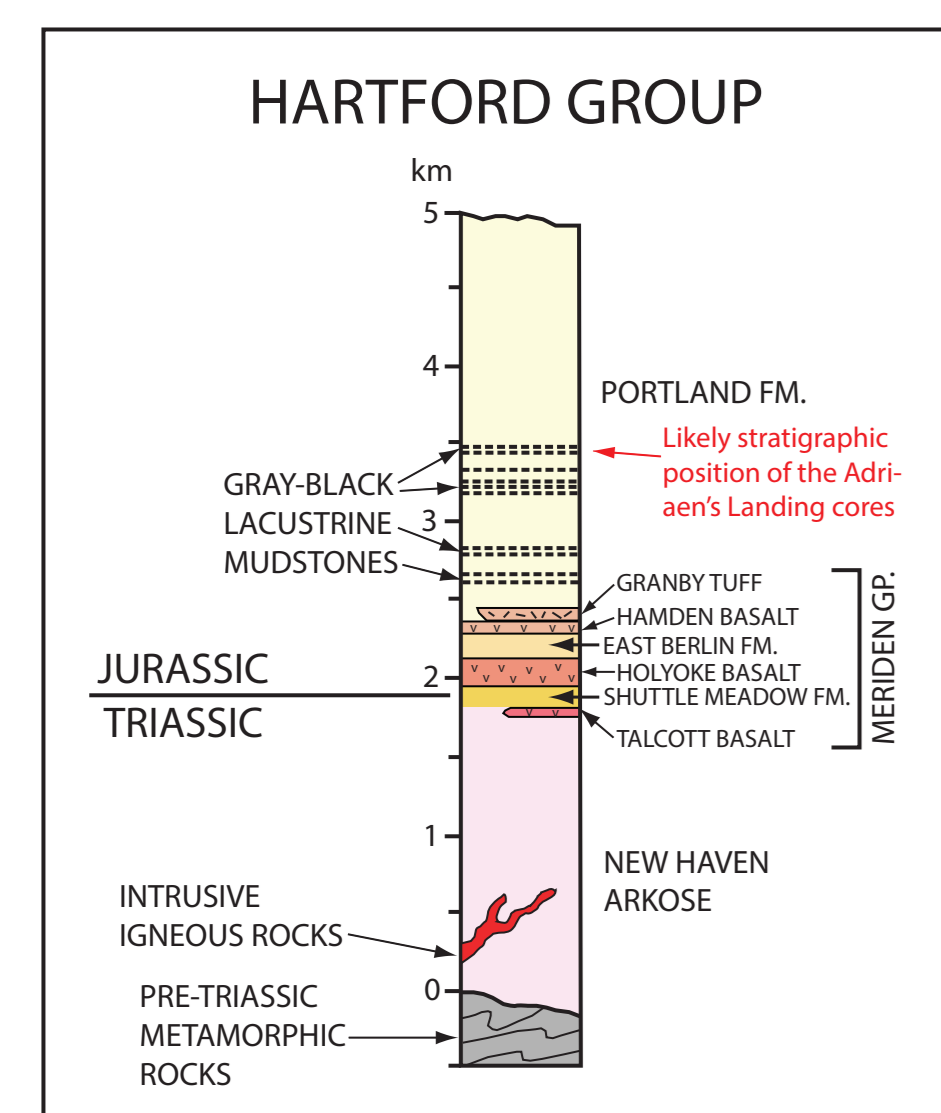
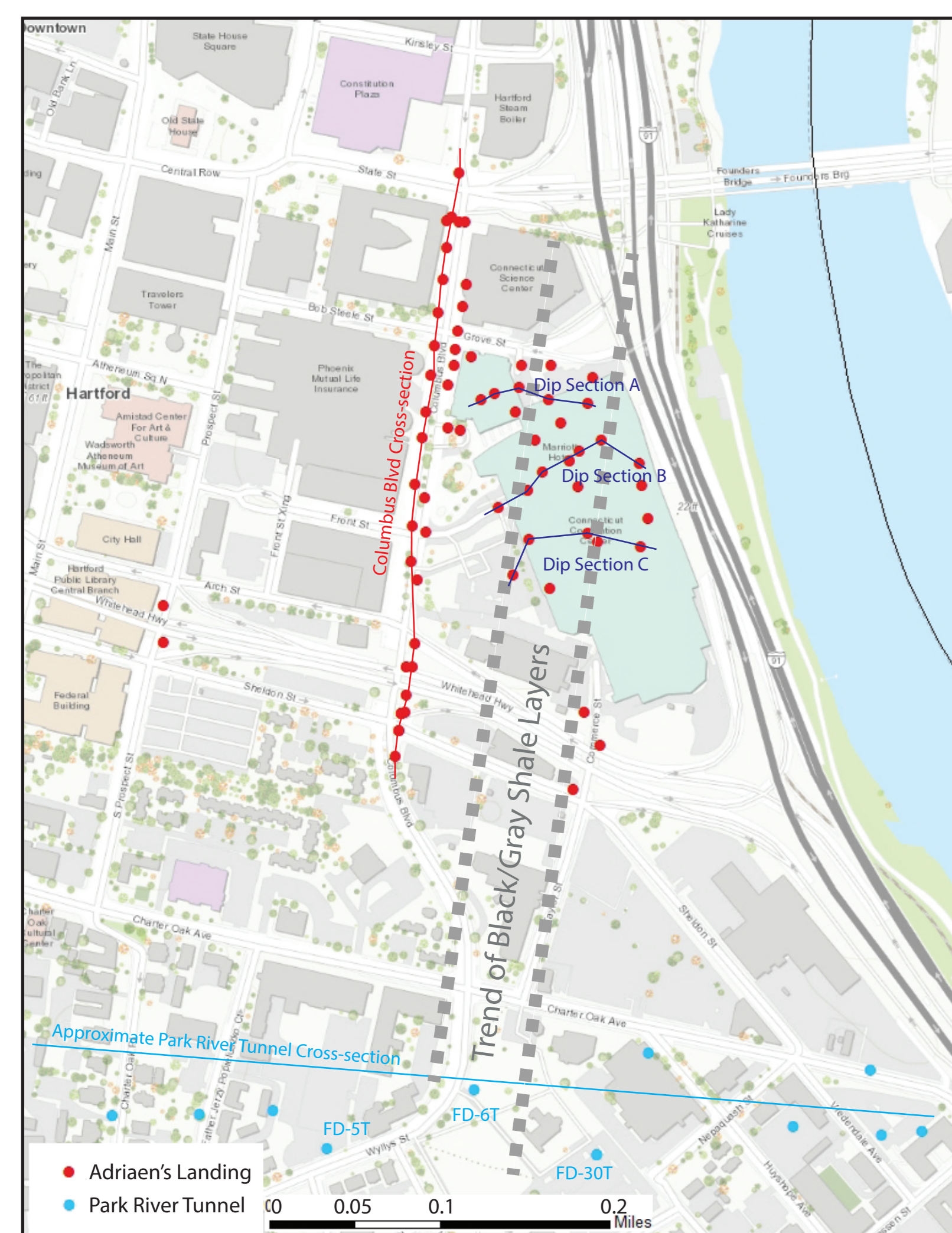


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1. SUMMARY

The lower Portland Formation (Jurassic) of the Hartford Basin is composed of mudstone-rich lake and dry lake facies with lesser amounts of river sandstone deposited in a rift basin associated with the break-up of Pangaea. 71 closely spaced bedrock cores drilled in the Adriaen's Landing region of downtown Hartford, CT, provide a unique opportunity to examine 3-D stratal relationships within the lower Portland Fm. These cores are typically short (1.5-3m, with a few up to 14m) but densely spaced (30-50m from neighboring boreholes). We first produced a 520m long, N-S strike-parallel transect of 19 cores located along Columbus Blvd in Hartford. Most of the cores in this cross-section contain a bed with light-colored carbonate nodules making the correlation robust. Thus, it is possible to characterize along-strike variations in the dimensions of stratigraphic elements, such as the width of channels. Even though the wells are closely spaced, the short interval drilled for most wells makes 3-D correlation challenging. Fortunately, two distinct trends of black shale lake beds prove useful for developing a 3-D framework. Finally, the Adriaen's Landing cores were correlated with the older, better studied transect of Park River cores located 330m south of the Columbus Blvd section, in order to place the cores within a long-term stratigraphic framework. Sedimentary structures, notably carbonate nodules within gray shale, suggest the two lake intervals identified with the Adriaen's Landing cores correlate to the 1st and 2nd lake beds down from the top of the 500+ meter Park River composite stratigraphic column.

2. GEOLOGICAL BACKGROUND

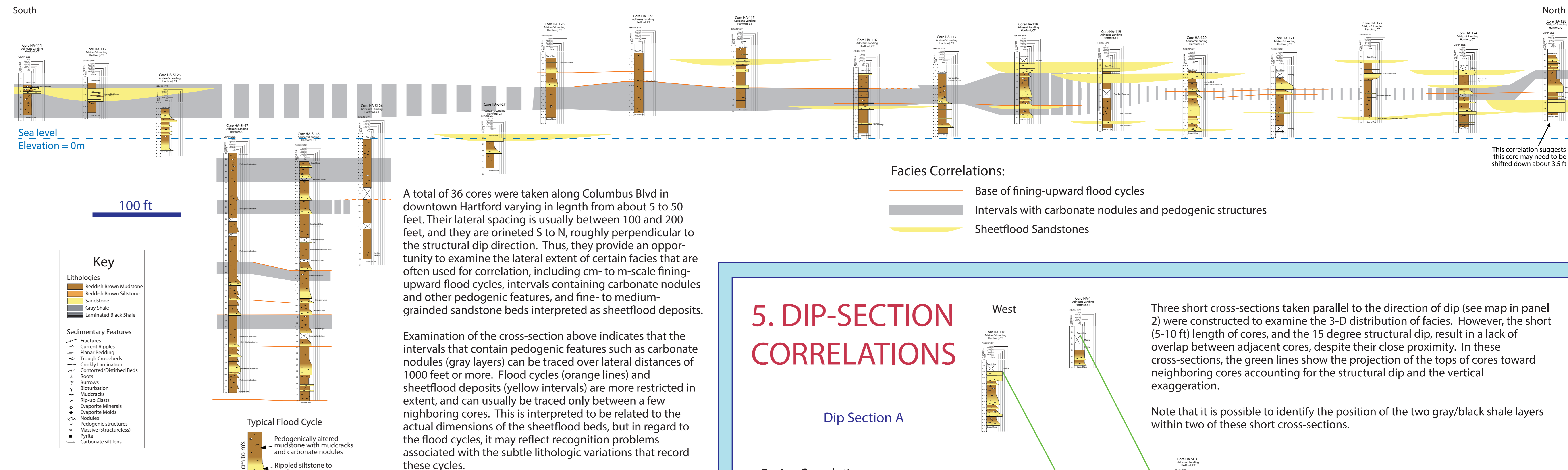


Location Map for this investigation. The map above is centered on the city of Hartford, CT and shows the location of the Adriaen's Landing cores (red dots) and the Park River Tunnel cores (blue dots). The Adriaen's Landing cores are short but densely spaced and offer an opportunity for high resolution correlation of depositional facies. Correlation of these cores to the Park River Tunnel transect to the south facilitates placement of the Adriaen's Landing cores into the larger scale stratigraphy of the lower Portland Formation.

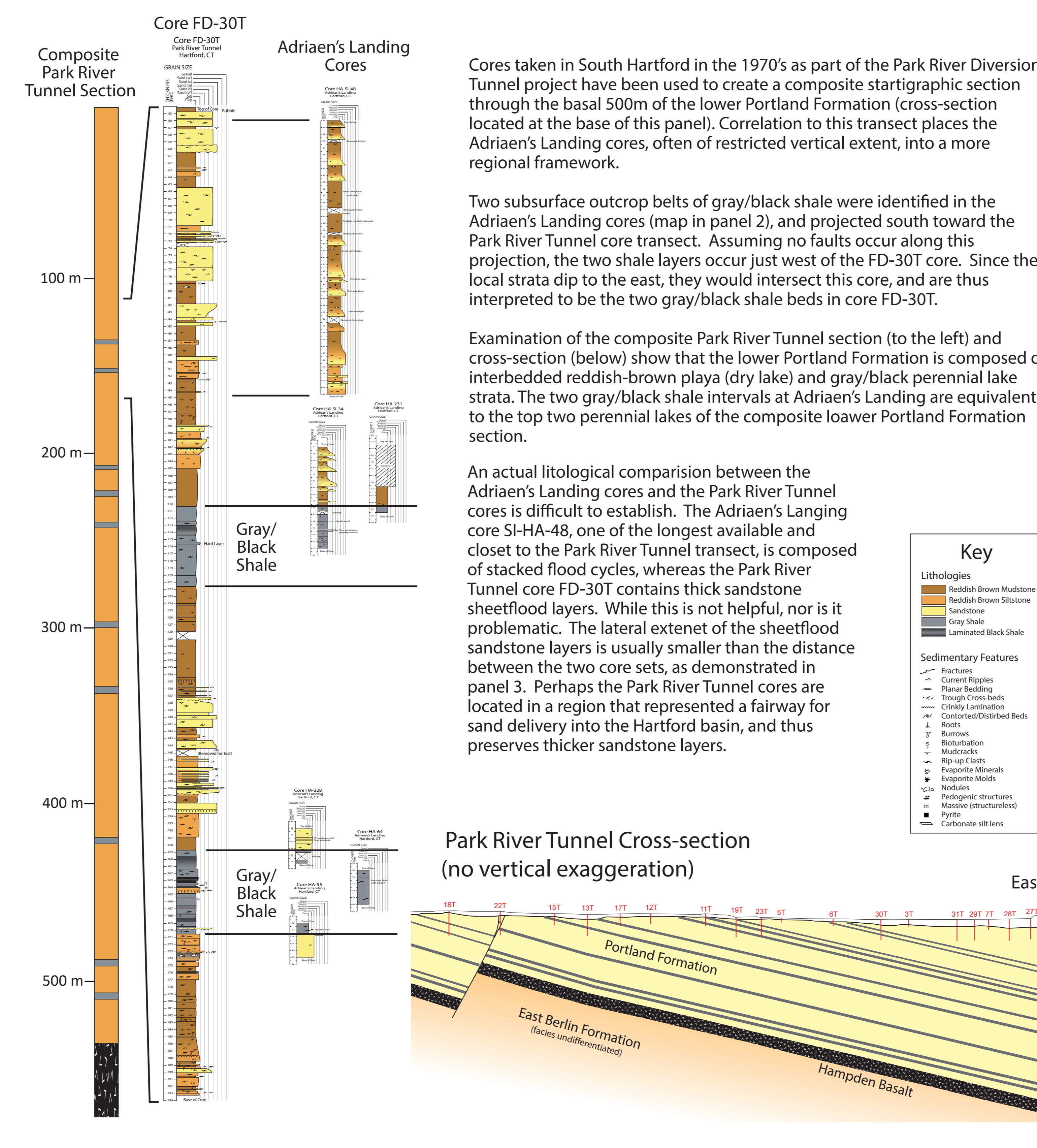
Stratigraphic column for the Hartford basin fill. The basin contains over 5 km of Late Triassic and Early Jurassic sediment. The strata investigated are part of the lower Portland Formation, which itself is a part of the Meriden Group. Modified from Hubert et al. (1992).

Densely spaced cores taken in downtown Hartford, CT as part of the Adriaen's Landing construction project (2000's) provide a unique opportunity to investigate the detailed 3-D distribution of depositional facies of the lacustrine lower Portland Formation, a stratigraphic interval that is not well exposed in the Hartford Basin. Their close proximity to the older Park River Tunnel cores (1970's) allow these observations to be placed within the larger-scale basin sedimentary fill.

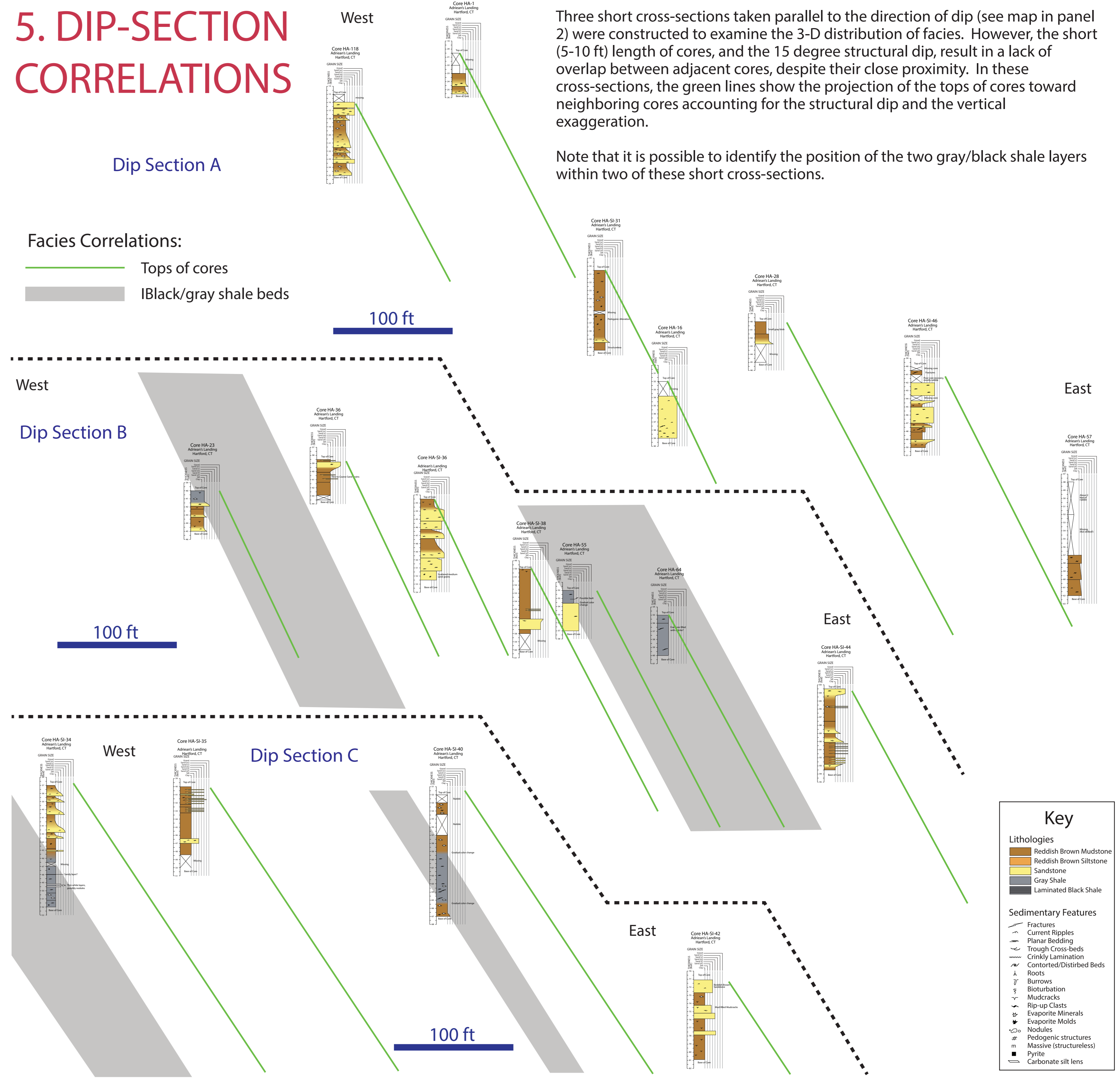
3. COLUMBUS BLVD (ALONG STRIKE) CORRELATION



4. CORRELATION TO PARK RIVER CORES



5. DIP-SECTION CORRELATIONS



6. CONCLUSIONS

1. The Adriaen's Landing cores provide a dense, 3-D dataset for examining the facies distribution of the basal part of the Lower Jurassic Portland Formation. There are 71 cores, typically 5-20 feet in length, with two approaching 50 feet.
2. A long transect perpendicular to the dip direction along Columbus Blvd in downtown Hartford demonstrates the usefulness of mudstone intervals containing pedogenic alteration, such as carbonate nodules, to correlate strata over long distances. Sheetflood sandstone beds and flood cycles are less useful.
3. Despite the close proximity of the cores, their short length, coupled with the 15 degree structural dip, do not allow dip-parallel correlation of strata as there is no stratigraphic overlap between adjacent cores.
4. Two gray/black shale intervals mapped within the Adriaen's Landing area have been correlated to the top two gray/black shale beds of the composite lower Portland Formation derived from the Park River Tunnel cores drilled in the 1970's.