

Delaware Canal Landmark and Mileage Chart (version: DelcanLandmark110503)

Update Notes: Fourth Edition, May 3, 2011

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1. All of the integer (and the Easton terminus) mile marker points: The “IN” designations were removed since the milestone installation project is now complete, including replacement of those missing / damaged as a consequence of the flood repair work (Nos. 11, 12, 15, 19)
2. ALL – Geographic Coordinates: Indicated precision was reduced from 6th decimal places to 5. The relation of latitude and longitude degrees to linear distance is approximately 0.00001 degree per meter in this region (0.000012 for longitude and 0.000009 for latitude). Positions on the survey maps appear to about the nearest 2 meters and after computer calibration of the survey grid the precision deteriorates a little more. Thus, 6 figure precision in the lat / long degrees is certainly not justified and even 5 may be dubious in many instances. Recall also that the underlying survey maps use the centerline of the canal for position measurement so that Milestone coordinates given are those at the centerline, from the maps, and not of the actual Milestone location adjacent to the towpath.
3. MPs 21.789, 28.863, 45.78, 48.573, 50.455, 51.327, 56.570, 58.002: All eight stop gates were repaired or rebuilt during the period 2008-2010. The names given are those currently used by staff of the Delaware Canal State Park (Richard Dalton, Park Manager) except for 58.002 which was given as Sewage Treatment Plant and I have called it Easton Treatment Plant.
4. MP 2.549: Added name Airport Rd parenthetically to Beaver Dam Rd.
5. MP 25.74: Named the Malcolm Crooks Bridge. “In recognition of his many years of volunteering and his advocacy of preservation, the Board announced that the foot bridge at Canal Park would have a sign installed designating the bridge as the Malcolm Crooks Bridge.” Minutes, Solebury Township Board of Supervisors, June 15, 2010.
6. MP 37.16: New entry. Old bridge abutment on berm side, and hilling up of ground on tow side, which was probably the location of the companion abutment. Garmin 60CSx GPS datum WGS 84 position on tow side bank: N 40.48532, W 75.06893, UTM 18T E 0494158, N 4481627. No indication on 1964/1977 survey map, but it is indicated on “OLD” survey maps as Farm Bridge at mile 37.3 which is about correct as the two surveys are slightly displaced as one progresses S to N from about 0.0 at Bristol to about 0.2 miles at Easton.
7. MP 42.19: New entry. Old bridge abutment on berm side. No remnants on towpath side but there is a farm path in approximate alignment that leads E toward River Road. Garmin 60CSx GPS datum WGS 84 position on tow side

- bank: N 40.55425, W 75.09016, UTM 18T E 0492366, N 4489281. No indication on either 1964/1977 survey map or on “OLD” survey map.
8. MP 44.513: Added “Mulligan’s Bridge” as the name more recently used by Delaware Canal State Park personnel. “Otto Hoffs” was the name used on the 1964/1977 survey sheet.
 9. MP 49.86: New entry. Foot bridge, appears to be for access to old stone house on tow path side. Garmin 60Csx GPS datum WGS 84 position on center of bridge: N 40.58768, W 75.19183, UTM 18T E 483767, N 4493005. Bridge shows on Google Earth, imagery of 12-30-02, N 40.587631, W 75.191848. Mile position of 49.86 determined with Google Earth distance tool relative to position of MP 50.
 10. MP 50.28: New entry. Foot bridge. New Riegelsville canal bridge from parking lot on Durham Street through to Roebing suspension bridge. Garmin 60Csx GPS datum WGS 84 position on center of bridge: N 40.59375, W 75.19277, UTM 18T E 483689, N 4493680. No “leafless imagery” yet available to determine Google Earth position. Interpolation of measured GPS position between Delaware Road bridge at 50.340, and MP 50, positions using Google Earth measuring tool yields 50.281 and 50.285 respectively for an average rounded to 50.28.
 11. MP 58.03: New entry. Flop gate. This is in bottom of canal prism about 155 ft. or 0.030 mile N of stop gate at 58.002. Garmin III datum NAD 83 measurement on 3-28-09 on edge of canal bank perpendicular to gate position: N 40.67957, W 75.19341, UTM 18T E 483655, N 4503205. Using difference between these UTM coordinates and those of the stop gate yields 48.1 meters = 158 ft = 0.030 mile. Using the measuring tool on Google Earth from the stop gate position middle of the prism to the flop gate position estimated at the middle of the prism yields 0.029 mile.

Survey map sheet 91 has a coarse arrow drawn to this approximate location with the notation “RIVER INLET VIA SQUARE WOODEN PLUG & 24” C.I.P.”. Using the scale of the map of 500’ grid intervals, the estimated distance from the stop gate to the arrow point is 140 ft, in decent agreement with the measurements described above. Presumably C.I.P. means cast iron pipe.

Delaware Canal Landmark and Mileage Chart (version DelcanLandmark100126)

Update Notes: Third Edition, January 26, 2010

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1. MP 19.60. New entry. Old bridge abutment. Garmin GPS IIN N 40.31002, W -74.89630; Easting 508811, Northing 4462172.

Registered 0.40 mile S of MP 20 goto on GPS IIN. Only berm side now present, but area on tow side indicates road / path partial continuation perpendicular to tow. Photos taken of both berm and tow sides.

Text on 1964/1977 Map sheet 31 says “old bridge abutment”, in the proper approximate location.

On the OLD survey Map 19, this “farm bridge” is indicated at 19.70 as connecting the properties of John M. Buckland (tow side) and Horace B. Hunt (berm side).

Same sheet 19 also shows “farm bridge” at 19.40 (the old bridge abutment indicated presently at 19.37) which has J.R. Comley Est. on both sides.

Same sheet also shows “farm bridge” at 19.20 (the one indicated presently at 19.120) which has B. Malone Est. on both sides. This is “Malone’s Upper Bridge” in the 1964/1977 survey, the bridge at the David Library.

2. MP 26.136. Change Phillip’s to Phillips’.
3. MP 25.65. A change from 25.69 to 25.65 and also update of coordinates. Previous coordinates were estimated from approximate GPS reading, and mileage using a map interpolation between Rabbit Run bridge and Phillips’ Mill bridge. New coordinate data is estimated from Google Earth imagery at center of bridge and center of canal. N 40.378632, W-74.957856 NAD 83. Mileage interpolated as above using Google Earth distance tool.
4. MP 25.74. New entry. New foot bridge in 2009 over canal to towpath from Solebury Canal Park. Coordinates are from 3 minutes GPS average in center of bridge and canal. Garmin 60Csx N 40.37988, W-74.95815 NAD 83. Bridge not yet on Google Earth imagery. Mileage interpolated from measured coordinate point as average between Rabbit Run bridge and Phillips’ Mill bridge using Google Earth distance tool.

Delaware Canal Landmark and Mileage Chart (version DelcanLandmark090222)
Update Notes: Second Edition, February 22, 2009
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General: non-substantive grammatical / content changes are not noted below

1. “**IN**”: additional Milestones installed since previous edition are: 5, 7, 8, 9, 17, 39, 40
2. MP 1.213, overflow from Lagoon, with foot bridge

Notes: newly added feature, not present on 1964/1977 survey Map 3. Mile point and coordinates measured on Google Earth with the path measurement tool. Mile point measured from Jefferson Avenue as 546 ft or 0.103 mile which yields Mile point as $1.110 + 0.103 = 1.213$. As a check, the total distance between Jefferson Avenue and the RR overpass at 1.297 was measured as 992 ft or 0.188 mile vs. the survey distance of $1.297 - 1.110 = 0.187$ mile.

The coordinates of the overflow (measured at the estimated equivalent canal center) were 40.106254, -74.850548 latitude / longitude.

3. MP 1.424, waste gate: added ID: (*Adams Hollow Creek*)
4. MP 1.47 to 2.12, Municipal Boundaries along canal

Note: canal is within Bristol Boro until MP 1.47, at which point Bristol Boro is only on the E side of the canal and Bristol Township is on the W side of the canal. The canal itself, as shown on the Bristol topographic map and the county tax map, is in Bristol Township. At MP 2.12, both sides of the canal are wholly within Bristol Township.

5. MP 5.582, Mill Creek Rd: added: (*Falls Township Park - 0.1 mile west*)
6. MP 13.01 to 13.45 to 14.58, Municipal Boundaries along canal

Note: canal is within Lower Makefield Township until MP 13.01, at which point Lower Makefield is only on the E side of the canal and Yardley Boro is on the W side of the canal. The canal itself, as shown on the Yardley topographic map and the county tax map, is in Yardley Boro. At MP 13.45, both sides of the canal are wholly within Yardley Boro.

At MP 14.58 both sides of the canal leave Yardley Boro and reenter Lower Makefield Township.

7. MP 13.25, new estimated MP: Path to Macclesfield Park

Note: position and MP estimated using Google Earth. Path enters N end of park

8. MP 15.093, estimated per below: Entered, from survey: overflow, concrete (survey called it “spillway”).

Notes: 24.7’ (plus 27’ slope at each end) long X 12.8’ wide spillway opposite creek per survey Map 24. Thus, total concrete structure is 78.7 ft.

The 1964/1977 survey Map 24 indicates the overflow only approximately, i.e., without a mile location, but was estimated from digitized survey map as about 15.10. Visited site on 10-25-05 and wheeled along towpath on canal side from center line of I-95 bridge to N edge of concrete as 87’9” and to S edge as 166’7”, which adding and dividing by 2 yields 127’2” or 127.2 ft = 0.024 mile from I-95 centerline to center of overflow. Thus, the overflow center is at $15.117 - 0.024 = 15.093$ mile. The length of the structure per my measurement is $166’7” - 87’9” = 78’10” = 78.8$ ft. vs. 78.7 per survey map. Coordinates given are those of original estimated position on digitized survey map.

9. MP 15.240, estimated per below:

Notes: The 1964/1977 survey Map 24 indicates the waste gate only approximately, i.e. without a mile location, but estimated from digital map as 15.24. On 10-25-08 I wheeled the distance from the center of Woodside Road to the center of the waste gate as 73’0” = 0.013 mile, thus waste gate is at $MP\ 15.227 + 0.013 = 15.240$. Coordinates given are those of original estimated position on digitized survey map.

10. MP 16.348, text “Queen Truss bridge” replaced with “bridge, queen post truss”

11. MP 17.589, bridge, camelback (White’s Bridge”).

Notes: The 1964/1977 survey Map 38 indicates this bridge. It is no longer present and the traces of the abutments are easily missed. On the towpath side there is no evidence except for a small rise to the E of the towpath which is the remains of the earth ramp that led to the E end of the bridge. There is now a path leading E from the rise which appears to be the trace of the road to the bridge. On the berm side there is also an easily missed small rise, and near the water level there is a concentration of stones, more or less randomly positioned, which may be remains of the abutment.

12. MP 19.37, estimated per below: entered, from survey: old bridge abutment

Notes: The 1964/1977 survey Map 30 shows dashed lines for old bridge abutment on both the tow path and berm side of the canal. However during a walk through in October 2008 only the berm side abutment remains. This is at or very near the flood washouts of the recent past on the tow path side. A reinspection would be in order to more thoroughly examine for any traces on the tow side.

Using GPSy on digitized survey map for NAD 83 yields UTM 509127 Easting, 4461967 Northing and 40.3082, -74.8926 lat and long. From this UTM and the UTM coordinates of the N edge of Map 30 at MP 19.497, calculate abutment remains as 655 ft (0.124 mi) S yielding the MP as 19.373, rounded to 19.37.

13. MP 21.011, entered, from survey: old bridge abutment

Note: Originally had entered location as identical to MP 21.000. Reinspection of Map 33 shows abutment is slightly N of the MP 21. New coordinates and mileage obtained using GPSy on the digitized Map 33. Difference in UTM metric coordinates for MP 21 and the abutment yields distance of 56.5 ft = 0.011 mile.

14. MP 21.459, bridge, concrete deck: added ID per Susan Taylor (*Rossiter's*)

15. MP 21.819, waste gate. Entered ID as (*Bowman's Hill*)

Note: The 1964/1977 survey Map 34, and the earlier survey Map 22, identify the creek opposite the overflow at 22.614 as "Nealy's", not Pidcock. The earlier survey Map 21 also identifies the stop gate at 21.789, next to the waste gate, as "Nealy's Guard Lock". Actually Map 22 of the older survey show both "Nealy's Creek" (the one in question here) and, about 0.6 mi N, a "Pidcock Creek" (with a "t"). "Nealy" often also spelled "Neely".

16. MP 23.771, estimated: entered, from survey: old stop gate (regulated flow into paper mill)

17. MP 23.573, changed entry from: waste gate (flop gate), to: flop gate (controls river entry to canal).

18. MP 27.213, Upper Limeport Bridge: added ID from 1964 survey Map 42 (*Col. Haines*)

19. MP 27.631, estimated: entered, from survey: overflow, concrete

Note: 2'7" X 60' overflow opposite small creek per survey Map 43. On 10-30-08 I wheeled the distance along the towpath S from the center of the Route 263 bridge (Centre Bridge-Stockton) to the N and S ends of the concrete portion of the overall overflow structure as 221' and 305' respectively. This yields a midpoint of 263' = 0.050 mile from the bridge center. Thus the overflow midpoint is at mile 27.681 - 0.050 = 27.631.

The overall overflow structure is then 305' - 221' = 84'. The actual central overflow portion is 60' per Map 43 and the raised concrete portions at each end that confine the gap are 12' each.

Using GPSy on digitized survey map for NAD 83 yields UTM 501757 Easting, 4472320 Northing and 40.4015, -74.9793 lat and long of the overflow center. The distance from these UTM metric coordinates to the Route 263 bridge coordinates of 501687, 4472359 is calculated as 80.1 meters = 263', in agreement with the measurement.

- 20. MP 31.425, Raritan Dam (*wing dam*): added: (*D&R Canal feeder enters on NJ side*)
- 21. MP 45.86, foot bridge (*at Indian Rock Inn*): replaced text (*washed out in H. Ivan flood*) with (*reset 2008 after Hurricane Ivan flood*)

Note: overlooked previously on survey Map 37. Location estimated by interpolation on paper map printout from digital file as 23.771 relative to 23.742, about 150' = 0.029 mile N of Waterworks entrance bridge.

- 22. MP 51.327, foot bridge (*to Mueller's Mini Mall*) replaced text (*destroyed in flood*) with (*repaired post flood*)
- 23. MP 56.918, Interstate 78: updated MP and coordinates of bridge

Note: previous coordinates obtained by GPS on towpath. Replaced with coordinates obtained using Google Earth at intersection of canal and I-78 bridge center.

Notes for previous version DelcanLandmark070404 (sources, methods, and use)

The majority of the landmarks and associated mile points were transcribed directly into a spreadsheet from the series of 92 strip charts from the 1964 canal survey. Mile points are expressed to 0.001 mile (ca. 5 ft.). Mile points in italics are the author's numbers, obtained variously by interpolation from the strip maps using a map wheel, on site GPS or survey wheel measurement, satellite maps, etc. They are believed to be accurate to within 0.01 mile.

Mr. Duane Carson of the Land Records Section of the Bureau of Facility Design of DCNR in Harrisburg provided both a set of 12 X 24 inch hard copies as well as 300 dpi scans of the survey strip maps. The survey map coordinates are in the PA State Plane system referenced to North American Datum 1927. The digitized versions were calibrated to GPSy mapping software on a Macintosh computer at typically four grid intersections. The PA coordinates of the canal landmarks were obtained and then converted to both UTM Zone 18 metric values and to geographic decimal degree coordinate equivalents for the newer North American Datum 1983 (WGS 84) using Corpscon for Windows 5.11.08 from USGS running on Windows/Virtual PC for Macintosh. The 5 figure precision indicated for the geographic coordinates merely reflects the raw output of the conversion software for the input UTM values which are certainly accurate to no better than 1 or 2 meters.

The UTM (Universal Transverse Mercator) coordinates are somewhat more “visual” than the geographic coordinates in that they are in actual linear distance (meters). Thus, the straight line distance between any two points is the root of the sum of squares of the differences between the N and E values. The author prefers UTM display for field use for GPS because of ease of getting a sense of practical degree of measurement noise, distance traveled, etc. Most web based map tools such as Google Earth (<http://earth.google.com/>), Google Map (<http://maps.google.com/maps?tab=wl>), and Mapquest use geographic coordinate input. Locating the proper entry panel for Mapquest is a bit tricky: (<http://www.mapquest.com/maps/main.adp?formtype=latlong>). Indeed, you can simply select and copy the set of Lat – Long coordinates of a landmark of interest, and then paste the set into the appropriate query box in the map tool to access the location on the map. The minus sign on the longitude is important. Try it as plus! The last column of the Landmark Chart shows the associated USGS 7.5' Topographic map quadrangle. These are available to download from the Penn State web site: <http://www.pasda.psu.edu/>. They are also 300 dpi scanned TIFF files.

NOTES ON SOME SPECIFIC MILE POINTS

1. MP 36.92. Google Map shows no features at this location, such as a bridge or road surface leading to that point. The survey map 1977 hand notation is: bridge “Petritis”, and in original 1964 type across the bridge symbol is “remains of abutment”. On site inspection needed to clarify present status, and if the two map notations refer to the same or different structures.

2. MP 1.297, 1.356. Google Earth shows former is present, but latter removed. However, can see traces of roadbed on area adjoining canal.
3. MP 24.044. Bridge at 24.001 is now blocked with posts. Newer bridge just north to parking lot of Chez Odette. Google Earth used to measure distance from old to new bridge as 227 ft or 0.043 mile, yielding 24.044. Coordinates in decimal degrees of newer bridge obtained on Google Earth and converted to DMS, and to UTM using Corpscon.
4. MP 4.31. Culvert inlet to Levittown Shopping Center just S of old KFC location at 4.36. Measurements with Google Earth path from outlet at 4.023 yields 1515 feet = 0.287 mile which gives 4.310. Also measures about 290 feet = 0.055 mile S of MP 4.36 which is in reasonable agreement since the latter is even more a visual estimate.
5. Municipal / Political Boundaries. Coordinates of intersections were obtained from boundaries indicated on USGS 7.5 minute topographic maps as follows: Bristol 1955, Trenton West 1955, Pennington 1954, Lambertville 1953, Lumberville 1955, Frenchtown 1955, Riegelsville 1956, Easton 1956. These maps are available digitally (scanned from paper) from Penn State at <http://www.pasda.psu.edu/>. Coordinates were obtained in datum NAD 1927 (that of the maps) using the viewer dlv32pro downloaded from USGS. Coordinates were converted to the current NAD 1983 datum (same as WGS 84) using Corpscon from USGS. The viewer also has a measuring tool so that distance from the political boundaries to the nearest surveyed physical feature on the canal could be measured, and the approximate mileage for the boundary thereby estimated. These have been recorded to the nearest 0.01 mile. There are two instances where there is a different municipality on the two sides of the canal. The first is the interval from mile 1.47 to 2.12. Bristol Boro is on the East of the canal, and Bristol Township is on the West. The second is the interval from 13.01 to 13.45, where Lower Makefield Township is on the East, and Yardley Boro is to the West. There is one instance where there is a political legislative district boundary within a municipality. House Districts 31 and 178 divide Upper Makefield Township along the canal at mile 17.852, Route 532 at Washington Crossing.
6. MP 32.349 Bridge across canal just S of Lock 13. Lat/Long and MP established using Google Earth referencing from MP 33.363, Lock 13. GE Measuring Tool shows distance from Lock 13 reference point to middle of bridge as 74 ft = 0.014 mile.
7. MP 22.164. Spelled "Nealy" on 1964/77 survey strip maps. Author uncertain if name is also, or perhaps even more properly, Pidcock Creek.