PROJECT LOCATION AND DESCRIPTION

Zoar Levee and Diversion Dam are located in Lawrence Township of Tuscarawas County, Ohio along flood plain of the Tuscarawas River, which is a tributary of the Muskingum River. The site is most easily accessed by traveling Rte. 212 east from Exit 93 off I-77 (Bolivar Exit). Zoar Levee and Diversion Dam are appurtenant structures to Dover Dam and are located approximately four miles upstream of the dam on the Tuscarawas River. Dover Dam is a dry dam and retains pools only during high water events to attenuate downstream flooding in coordination with other Muskingum Basin projects.

Zoar Levee

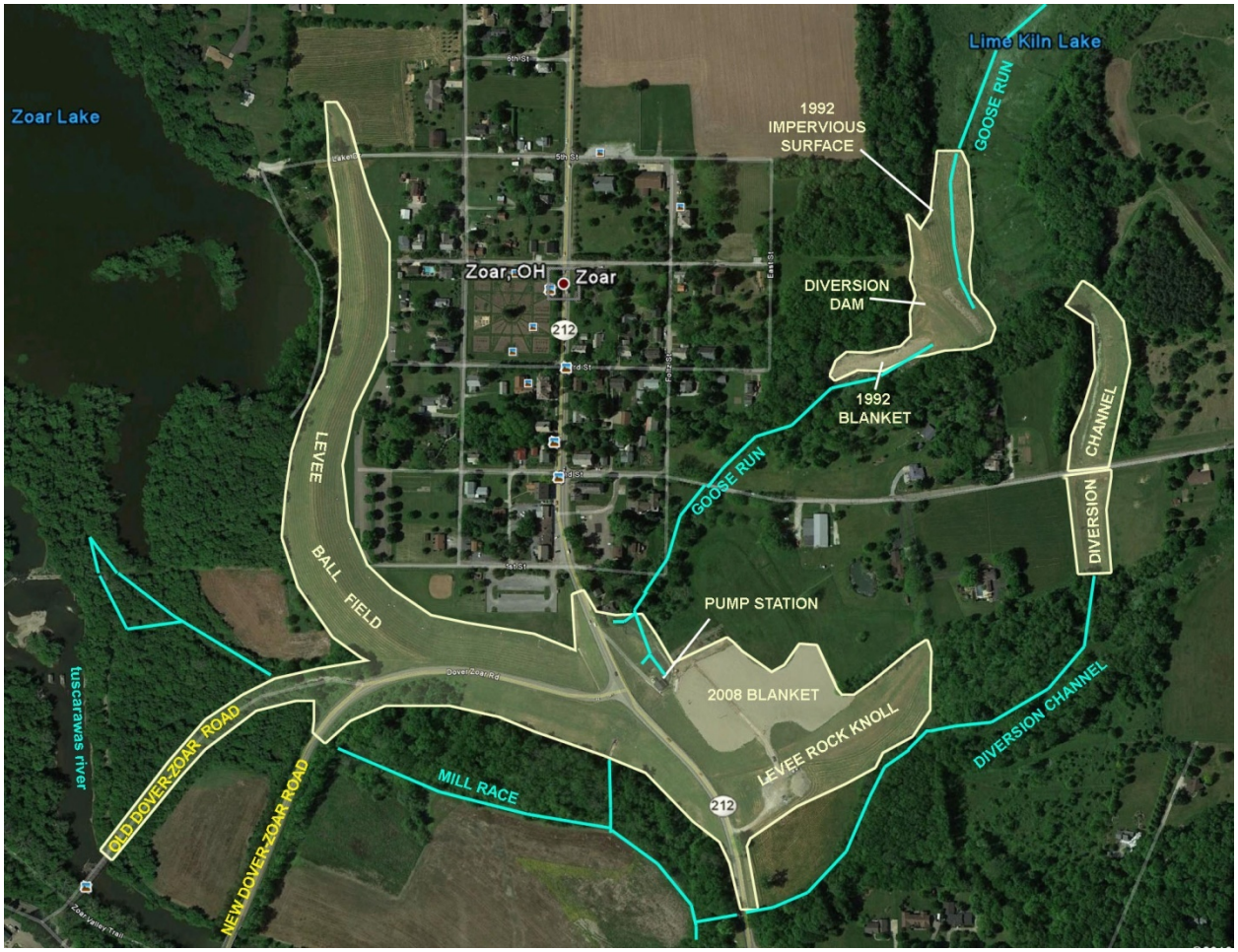
Zoar Levee provides flood damage reduction benefits to Zoar Village and provides protection when Dover Dam is retaining a pool above El. 890 (a 3-year event). As such the original crest elevation of the Zoar Levee was designed to correspond to the spillway elevation of Dover Dam at 916, with an additional 3 feet of freeboard for a resulting crest elevation of 919. Following work in 1951 (discussed later) the crest elevation was raised to 928.5. The federal government still maintains flowage easement upstream of Dover Dam to elevation 916. Without Zoar Levee and Diversion Dam, all portions of Zoar Village located at or below elevation 916 below would have been evacuated at the time of Dover Dam's construction.

Zoar Levee was constructed in 1937. The levee is a rolled-earth filled embankment with an impervious core and a crest length of 3,893 feet. The levee is constructed of zoned earthen fill with a central impervious core, sandy inner shells and impervious outer shells.

In 1951, the federal government made further investments in protecting Zoar Village. These investments raised the

levee crest elevation from El. 919 to El. 928.5. These outer shells, consisting of about 280,000 cu. yds of material were added on top of 330,000 cu. yds from the original construction. Today, the levee's maximum height is 45 feet.

The crest width is 8 ft, except for reaches that incorporate two roadways. Route 212 crosses the levee briefly in a north-to-south general orientation. Dover-Zoar Road, splits off Route 212 on the levee crest and runs along the crest of the levee heading west before it drops off to the south.



For discussion purposes, USACE generally breaks the levee into two reaches. The Ball Field reach of the levee is that portion located west of Route 212 and is called such due to the presence of a Little League Ball Field. The Ball Field reach is built upon a thin alluvial blanket overtop thick glacial outwash deposits, approximately 130 feet thick in the deepest valley section. These can be divided into upper and lower zones, averaging about 30 ft. and 100 ft. thick respectively.

The Upper Glacial Outwash is especially pervious and highly variable, generally composed of sands and gravels with only a small amount of silty fine-grained material. The Lower Glacial Outwash is not quite as conductive, and also tends to contain fairly prevalent clay and silt seams. The alluvium is a thin (usually only up to 5 ft. landward of the levee) impervious to

semi-pervious sandy clay and silt blanket atop the outwash. Being thin, this blanket is prone to heaving and cracking with relatively low uplift pressures, resulting in concentrated seepage exit points. In some locations, this blanket appears to be absent altogether.

The Rock Knoll reach (Station 25+00 to 39+12) is that portion of the levee located east of 212 and is characterized by glacial and alluvial deposits of variable thickness, situated on a localized bedrock high point that extends upward to the base of the levee; this area was "high ground" prior to the raising of the levee in 1951. This Rock Knoll reach consists of jointed and fractured sandstone and limestone, interbeded with shale. A thin layer of alluvium was left underneath the shells of the dam, but the core sits directly on bedrock.

Zoar Diversion Dam

Zoar Diversion Dam was also constructed in 1937. It is located on Goose Run, approximately 1,000 ft upstream of Zoar Levee and was built to control interior drainage as a retention structure for runoff from the Goose Run watershed. The diversion dam is a rolled earth-filled embankment with an impervious core. It is approximately 500 ft. long and 35 ft. high with a crest width of 16 ft. and a design crest elevation of 932 ft. The diversion dam consists of approximately 75,000 cu. yds of zoned earthen embankment with a central impervious core and pervious shells. The diversion dam foundation and abutments contain similar rock conditions described for the Rock Knoll reach of the levee.

The diversion dam is designed to retain a pool up to elevation 916 ft. After this elevation, water is diverted through an auxiliary spillway called the Zoar Diversion Channel, which empties into Dover Dam's flowage easement outside the levee. This diversion channel can also allow water retained by Dover Dam to back onto the Diversion Dam in the event a pool exceeds elevation 916 ft.

The purpose of the Zoar Diversion Dam is to limit flows of Goose Run to prevent interior flooding. In normal conditions, Goose Run flows through the dam's gated 3-x-3 ft concrete culvert (controlled by a single sluice gate beneath a concrete intake tower). Downstream of the diversion dam, Goose Run travels through Zoar Village, crossing 2nd Street before it empties into a ponding area on the Rock Knoll side of the level. Under normal conditions, Goose Run flows underneath Zoar Levee thru a 3-x-3 ft culvert. This culvert can be closed by a single sluice gate, located on the exterior embankment of Zoar Levee.

However, when Zoar Levee's exterior face is loaded by Dover Dam's pool, the outflow culvert underneath the levee must be closed. Zoar Pump Station is then used to pump water from Goose Run over the levee.

Zoar Pump Station

Zoar Pump Station was added in 1950 at the location Goose Run exits Zoar Levee to pump water released from Zoar Diversion Dam over the levee. The pump station also collects water from Zoar Village's interior storm water systems and the seepage collection measures put in place along the interior toe of the Ball Field and Rock Knoll sides of the levee. When originally built, two (2) pumps were installed with a capacity of pumping 15,000 gallons per minute (gpm), although room for a third pump was incorporated into the design. Between 2010-11, a third 15,000 gpm pump was added, all three pumps were automated, and a diesel powered emergency generator was installed. Today, the Zoar Pump Station can pump up to 45,000 gpm of water to the exterior of Zoar Levee. Pumped water exits the exterior slope of Zoar Levee via flap gates.

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