ASHOK AMMAIYAPPAN

Principal Engineer | Digital Engineering Lead

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Summary

Ashok is a highly experienced Engineer with over 15 years of expertise in leading and delivering major multidisciplinary infrastructure projects at Arcadis. His specialization spans geotechnics, transportation, hydraulic engineering, and structural engineering, with a strong focus on integrated project management to deliver efficient, high-quality solutions. Ashok is proficient in industry-standard tools such as Civil 3D, Leapfrog Works, Openground, Slope W, Plaxis 2D, and Staad Pro. He leverages collaboration platforms like ProjectWise, Autodesk Construction Cloud, Bluebeam, and SharePoint to enhance coordination, optimize workflows, and ensure seamless project delivery.

Ashok brings comprehensive expertise across all design stages, from optioneering and scheme design to value engineering, detailed design, and design & build. He possesses in-depth knowledge of international standards and codes, including the Canada DAM Association guidelines, Euro Codes (EC7), CIRIA guidelines, and Network Rail standards. Ashok excels in creating BIM-compliant design models using Civil 3D and advanced tools such as Infraworks 360 and Navisworks, ensuring precise, clash-free designs and models.

Key Expertise

- Digital Twin Technologies
- Innovation and Automation
- BEP/MIDIP/TDIP Frameworks
- Information Management
- Strategic Planning and Implementation
- Project Management
- Knowledge Management

Skills

- Earthworks
- Digital Sub-Surface Model
- Construction Drawings
- Drainage system
- Road Design and Vehicle Tracking
- Slope Stability Analysis
- Quality Check and Clash Detection
- Data Management and Auditing
- Training and Mentoring
- Surveying and Site Coordination

Education

Master of Engineering: Structural Engineering – 2017 Anna University, Chennai

Bachelor of Engineering: Civil Engineering – 2011 Anna University, Chennai

Employment History

2023	– Date	Arcadis Consulting India	– Principal Engineer – Digital Engineering Lead
2018	– 2023	Arcadis Consulting India	– Senior Engineer – Digital Engineering Solutions
2014	– 2017	Arcadis Consulting India	– Principal Designer- Geotechnics
2013	– 2014	Total Environment	– Lead CAD Designer – Buildings
2011	– 2013	Mott McDonald India	– CAD Designer – Metro Infrastructure
2006	– 2008	Secon India Pvt Ltd	– Site Engineer – Survey and Data Collection

Leapfrog Projects

Honiton Tunnel Portal, London End, UK

Detailed Design

The stabilization of the earthworks around the east portal of the tunnel is a critical project aimed at ensuring long-term stability and safety for train operations. Geological investigations revealed that the site comprises the Upper Greensand Formation (granular/cohesive), the Gault Formation, and the Branscombe Mudstone Formation. The relative permeabilities of these formations indicated two key impermeable boundaries, which pose a risk of slope instability.

These impermeable boundaries could adversely affect the proposed drainage system by triggering slope instability. To address this, a ground model was developed to pinpoint these boundaries and guide the placement of inclined drains, ensuring they do not intersect these zones. This step was crucial to maintaining slope stability and optimizing drainage performance.

The creation of a subsurface 3D model was a complex process involving significant trial and error using the **OpenGround Cloud** borehole data. To ensure seamless geological connections, dummy boreholes were introduced. After several iterations, a comprehensive subsurface model was successfully developed using **Leapfrog** software.

This model provided valuable insights into the site's geological conditions, offering a detailed understanding of soil structure and geological patterns. The identification of impermeable boundaries was critical in determining the optimal placement of inclined drains. By accurately mapping these boundaries, we minimized the number of drains required, reducing overall project costs and improving sustainability.

The precise determination of impermeable zones enabled better water flow management, avoiding the need for additional drainage infrastructure. This approach resulted in a more cost-effective and efficient design, ensuring the long-term stability of the earthworks and drainage system.

HS2 – Thames Valley Viaduct, UK

Scheme Design

At the preliminary stage, we were tasked with developing a 3D subsurface model to understand the geological formations for the viaduct foundation. Using OpenGround borehole data and LiDAR surveys, we created a detailed subsurface model. This was then incorporated into a federated model in Leapfrog, allowing for seamless coordination of the proposed viaduct and pile foundation design, providing a clearer understanding of the geology in 3D space.

Civil3D Projects

City of Iqaluit – Long-Term Water Program, Canada

Conceptual Design of Reservoir and Dams

The reservoir was designed to accommodate a total capacity of 1.83 million cubic meters, with retention dams carefully integrated into the natural terrain to maximize water retention within the designated footprint. The entire design process, including the reservoir and dams, was meticulously executed using **Civil 3D** software, ensuring precision and adherence to project specifications.

The design process began with a detailed assessment to estimate the boundary and identify the optimal location for the dams. Key considerations included ground conditions, freeboard requirements, and the dam's maximum operating level. This comprehensive evaluation was crucial in determining the most effective and feasible design approach.

Several design options were developed and analysed to optimise excavation and rockfill quantities, with particular attention to adjusting excavation depths, side slopes, and berm configurations. The goal was to balance the material volumes and excavation effort, ultimately achieving both cost efficiency and environmental sustainability.

Once the most suitable design was identified, further refinements were made to ensure that the reservoir met the required storage capacity.

The final phase of the design involved precise calculations for storage capacity, excavation volumes, and rockfill quantities, validating that the proposed solution would meet all requirements. Additionally, the Riprap erosion protection layer and the geomembrane cushion layer were modelled separately using sub-assemblies, which allowed for accurate material quantity estimation.

Access Roads

Designed the access road using **Civil 3D** to facilitate efficient transportation throughout the project site. The road alignment was strategically proposed to connect all dams and link to the nearest existing road network. The design focused on minimizing excavation, optimizing it to suit the site's topography, ensuring a cost-effective and sustainable solution while maintaining ease of access across the project area.

Civil3D Projects

South-West Rail Resilience Programme
Parson's Tunnel to Teignmouth, Network Rail, UK

Detailed Design of Buttress Wall and Rock Anchors

The railway line spans approximately two kilometers along the coastline between Parson's Tunnel and Teignmouth Station, with a sea wall protecting the seaward side and a high cliff of soft, variable bedrock on the landward side. This section faces significant environmental risks, including beach erosion, cliff failure, and landslides. The proposed solution includes realigning the railway and constructing a buttress wall with rock anchors to stabilise the cliff. The buttress wall design was developed using **Civil 3D**, incorporating point cloud data, subassemblies, and corridor modeling to ensure accuracy. Key design parameters included an 11-meter setback from the proposed rail alignment and a 3-meter-wide walkway along the wall. The buttress was designed with a vertical slope of 50 degrees.

CP6 Wessex Frameworks
Honiton London End, Slope Stabilization - UK

Detailed Design

The Honiton Tunnel Portal stabilization project adopts a comprehensive strategy to ensure the long-term stability of the surrounding slopes and earthworks. To streamline construction, the site was divided into multiple areas, allowing for parallel work on different sections. Key stabilization measures include **slope regrading**, **soil nailing**, and the installation of a **King Post Wall**. I am responsible for overseeing the complete **Civil 3D** design model production and conducting quality checks. The initial phase involved creating localised 3D models to facilitate slope regrading, ensuring the design met project specifications and accurately estimating earthwork quantities for both existing cut and proposed fill materials.

In addition, the **soil nails** in 3D to perform clash detection with adjacent nails and verify that all deep nails were installed within the **Network Rail Boundary**. An integrated **drainage system** was implemented to manage water flow and prevent erosion. The drainage system was carefully designed to work in conjunction with the geotechnical works.

CP6 Grazeley Embankment – UK

Detailed Design

I was responsible for developing a 3D model in Civil 3D that included a King Sheet Pile wall and proposed regrading. This model helped resolve several design constraints and significantly accelerated the workflow by allowing us to generate dynamic cross-sections and elevations through Civil 3D's integrated dynamic functionality. Previously, we relied on 2D methods, which involved assumptions for many elements. The switch to 3D modeling enhanced design accuracy by providing precise levels exactly where needed.

Civil3D Projects

BASF Chemical Zhanjiang Integration Project China – Arcadis Germany
3D Geological Model

Preliminary Design

I was tasked with developing a 3D geological model of an entire landfill site using available geological investigation data, which consisted of 2D geological cross-sections. The process began by manually inputting the data into a **HoleBase** database and assigning geological codes for interpretation. Each geological formation was then modeled as 3D solids, connecting similar strata across all boreholes using the fence diagram method. These individual fence models were integrated and combined to create 3D volumes, which were finalized in **Civil 3D** to provide a comprehensive geological model of the site.

HS2, London to Birmingham - UK

Scheme and Detailed Design

Responsible for creating Geological Long and Cross Sections for the entire HS2-C2 and HS2-C3 stretches using OpenGround investigation data integrated into Civil 3D. This task required meticulous attention to detail, as it involved generating geological profiles for specific assets and structures in accordance with the project's precise requirements.

The project involved continuous data updates in Openground, making close collaboration with Data Management, GIS, and Earthworks teams crucial. These teams worked together to ensure that the most up-to-date information was used throughout the design process. To streamline the workflow, played a key role in developing multiple automated processes to simplify the generation and interpretation of geological cross sections in Civil 3D. These workflows improved efficiency and ensured the geological data was accurately represented for decision-making and design execution.

Shotts Electrification Scheme – Highway Agency, UK

Network Rail proposed to electrify the existing 22-mile Holy Town to Mid Calder (via Shotts) line, connecting Glasgow and Edinburgh. My responsibilities included preparing a comprehensive Civil 3D surface model utilizing Network Rail's LiDAR data, along with producing cross-sections for overhead line equipment (OLE) structure pairs. The entire electrification scheme was divided into 30 track units, with each unit comprising a minimum of 25 detailed cross-sections. These cross-sections illustrated the limitations of traditional topographical survey data, highlighting the importance of integrating various types of information. To enhance the accuracy and usability of the project data, I have compiled available survey, geotechnical, and route information using a Geographic Information System (GIS). This approach enabled the creation of multiple map layers that were geo-referenced to a common scale, allowing for simultaneous viewing and analysis of the integrated data.

Other Project Experience

CP6 Wessex Framework, UK

GEC Checker

Responsible for overseeing the earthworks packages, focusing on producing detailed 2D construction drawings for various slope stabilization designs. These designs encompassed a range of stabilization techniques, including sheet pile walls, king post walls, gabion walls, soil nails, and ground anchors.

The role required close coordination between multidisciplinary teams to ensure that all earthworks-related models and drawings adhered to project specifications, industry standards, and safety regulations. My team utilized advanced BIM methodology to develop accurate construction drawings that represented the complexities of the slope stabilization methods, which were critical for both visualization and precise execution on site, produced highly detailed 2D construction drawings, providing essential information for contractors and ensuring smooth construction workflows.

CP5 Wessex Framework, UK

GEC Producer and Checker

Responsible for delivering geotechnical drawings to Osborne/Octavius, the Principal Contractor, under the Network Rail CP5 framework. My tasks involved producing highly detailed drawings for a range of repair schemes, including designs for sheet pile walls, king post walls, gabion walls, soil nails, and ground anchors. These repair works were critical for the stabilization and safety of railway infrastructure.

In collaboration with geotechnical and structural engineers, developed precise construction drawings that integrated technical specifications and design requirements. This collaborative approach ensured that all geotechnical solutions were robust, technically sound, and aligned with engineering standards.

A key aspect of this role was strict adherence to Network Rail’s design process, following Form 001 (Approval in Principle), Form 002 (Detailed Design), and Form 003 (Certificate of Design and Check). I have ensured that all drawings met Network Rail's rigorous design and CAD standards, guaranteeing the delivery of comprehensive, accurate, and compliant drawings for earthwork projects. His work facilitated clear communication between the design and construction teams, supporting the timely and effective implementation of geotechnical solutions on site.

Other Project Experience

Cutting 17 Todmorden, UK

Following a period of wet weather in December 2016, a large landslip developed on the hillside above a section of the Rochdale canal causing the canal to become blocked by the sliding mass. The slip was approximately 20m at its widest point and there were further signs of movement of the slope immediately below a private property and driveway located above the slip. Arcadis was tasked with preparing a design to stabilize the slope above and remove the slipped mass to allow the re-opening of the canal. Responsibilities included the preparation of geotechnical framework drawings and proposals for sheet pile wall solution and drainage arrangement.

Lower Thames Crossing – Highway Agency, UK

Responsible for the preparation of Geological Profile drawings. The drawings were part of an initial step in the planning and feasibility stage of the project, aiding in identifying potential constraints to a route option and identifying the geology and characteristic design values for preliminary design.

Crossrail 2 – Transport of London, UK

Responsible for preparation of Geological Plan and Profile drawings for 34 km underground tunnel running from Wimbledon to New Southgate. The drawings were part of an initial step in the planning and feasibility stage of the project, aiding in identifying potential constraints to a particular route option and identifying the geology and characteristic design values for preliminary design.

Manchester Smart Motorways – Highway Agency Project, UK

Responsible for drawings for the detailed geotechnical design for the scheme, concerning the upgrade of a 28km of motorway along the M60/M62. This involved the detailed design of new piled and spread gantry foundations and all verge-widening solutions. Other tasks included preparing and modifying geology along the route with ground investigation updates.

BHAU Institute of Innovation, Pune

Responsible for preparation of Structural layout & details for G+3 Institution building special structure with spherical shape. Preparation of RC detailing drawings in coordination with architectural and MEP drawings. Preparation of Bar Bending Schedule for rebars. Issuing GFC drawings. Preparation of steel foot over bridge detailing which connects 28m span.

Other Project Experience

The Magic Faraway Tree, Bangalore

Involved with the Preparation of Structural layout & details for the G+30 High-rise Apartment Building. Two levels of basement parking layout preparation. Preparation of 3D framing using Revit. Preparation of structural layout and RC details for transformer yard and metering panel. RC details for the underground water sump and core cut details are as per service requirements.

Majestic Interchange Metro Underground Station for BMRCL at Bangalore.

Responsible for the preparation of detailed drawings of Permanent works for the Majestic Metro Underground Station. Preparation of Structural Layout & drawings in coordination with Architectural, MEP & Service contractors, as per the project requirement.

East-West Corridor (UG-2) for BMRCL, Bangalore

Responsible for preparing detailed drawings of Permanent works for Vidhana Soudha Metro Underground Station. Preparation of Structural Layout & drawings in coordination with Architectural, MEP & Service contractors, as per the project requirement. Coordinate with engineers to develop engineering change notices. Responsible for the quality and timely issue of the drawings.

Design of Permanent Structures for Reach-4 for BMRCL at Bangalore.

Responsible for the preparation of detailed drawings of Permanent works for Elevated Metro structures. Preparation of Structural Layout & drawings in coordination with Architectural, MEP & Service contractors, as per the project requirement. Coordinate with engineers to develop engineering change notices. Responsible for the quality and timely issue of the drawings.

Design and Construction of Viaduct and Stations for RVNL at Kolkata

Responsible for the preparation of detailed drawings of Embankment Viaduct structures. Preparation of Structural Layout & drawings in coordination with Architectural, MEP & Service contractors, as per the project requirement. Coordinate with engineers to develop engineering change notices. Responsible for the quality and timely issue of the drawings.