

HISTORY OF ROADS IN SRI LANKA

The island of Ceylon (Sri Lanka) has a recorded history, starting from about 6 to 7th century B.C. Although there are so many physical evidences still available in the island to prove that the ancient islanders were experts in Hydraulic Irrigation Engineering and in Structural Architecture, there are only very few physical evidences available to prove their capabilities in the road construction field. However the history of bridges in the island appears to be rich in historical and archaeological evidence. The remains of three stone bridges discovered in Anuradhapura district can be cited as the oldest surviving example of bridges in ancient Sri Lanka. With some stone pillar and rock inscriptions found among ancient ruins and few discoveries made under Jethavanarama archeological explorations, make it possible to infer without doubt that our ancestors would have had a reasonably good system of road network. Some of the ancient chronicles such as "Mahawansa", "Deepawansa", "Dhatuwansa " etc., too mention about streets ("Veethi") that existed in the ancient capital cities and the roads("Magga") connecting the Capital with towns in regional kingdoms in the country. According to these chronicles the ancient measurement unit of road length is referred to as "Gauwwa" which is approximately equal to 6.4 kilometers in modern day measurments as explained by the historians.

The stone bridge constructed across Malwatu Oya found in Anuradhapura is believed to be on the Northern bound ancient road connecting the Anuradhapura Capital with "Dambakola pattana" (Jaffna).



Major portion of the bridge is now in a collapsed state leaving only a small section to be seen as a bridge. The deck consists of stone slab beams about 2.5 metres long 300 mm wide with a 400 mm thickness spanning across stone cross beams supported by vertical stone pillars acting as centre piers. The second stone bridge found in 1997 near "Kanadara" tank in Anuradhapura is still has a 80 feet length in a stable condition. It has a width of 8 feet along its full

length and similar in construction to the Malwatu Oya stone bridge. It is believed to be constructed across "Kanaa Oya" by King Mahasena (274-301 A.D.) on the ancient road connecting Anuradhapura capital with "Gokanna"(Trincomalee) the Coastal Port via Mihintale and Ratmale before constructing the Irrigation Tank named as "Kanadara Wewa"

Archeological excavations carried out in 1960 under Jethawanarama project near the Southern entrance to the ancient city of Anuradhapura, an old "Veethi" with a 57 feet wide pavement had been discovered. The ancient stone inscription found at Dimbulagala describes how the "Mara Veethi" was constructed using broken aggregate to have an even surface. The pillar inscription at Galpotha in Polonnaruwa District which is a granite slab of 24' 6" x 4" 6" in area, mentions that it was transported from "Sigiriya"(Mihintale) to Polonnaruwa. This itself indicates that the ancient roads had been constructed with strong and wide pavements to carry heavy loads of considerable dimensions. According to the stone

pillar inscription at Mihintale belongs to 9th Century A.D. It is believed that the state executives had maintained the roads through labour obtained under the "Rajakariya" system. The "Annaikutti mountain cave" inscription at Mihintale even describes the designations of these road maintenance executive officers as "Pakara Adeka".

C.W.Nichols in his writings giving the details about these roads in ancient and medieval Sri Lanka, mentions that "the ancient Sinhalese who had excelled in Hydraulic Irrigation engineering would have easily understood how to make use of contour lines for its maximum benefit in road construction and how to prevent their roads from erosion".



Due to the frequent internal conflicts and foreign invasions that took place after the Anuradhapura & Polonnaruwa periods, the golden eras of the Sinhala civilization that lasted for more than 13 centuries since 3rd century A.D., the capital city along with the kingdom had been shifted to several places in the country. The rulers were not taken keen interest to maintain a good road network in the island thinking that it would help the opponents and foreign invaders to conquer their kingdoms easily. Only very few limited communication routes were maintained outside their territories. However, there are indications that the internal streets within the capital city and roads to sacred places had been maintained up to a certain standard.

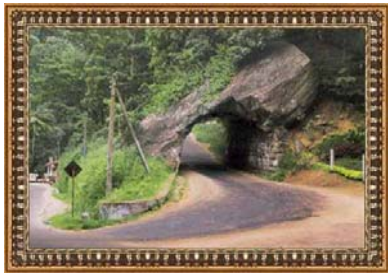
The "Bogoda wooden Bridge" still being used by the people to cross "Gallanda Oya" in Badulla district is a unique construction as it has a 8 feet tall tiled roof structure for its entire span of nearly 50 feet length with a 6 feet breadth. This wooden Bridge is believed to be constructed during the "Dambadeni" kingdom period (1236-1270 A.D.).

All this literary and archeological evidence reveals the existence of an indigenous bridge building technology in the island prior to the influence of industrialization.

These Kings who ruled the country after the Polonnaruwa era were not able to reign peacefully and maintain their kingdoms for long periods as in the past. This situation has gradually affected the country's development. Some old cities were abandoned by the people and migrated to other areas with the political situation in the country. As a result the old roads to those areas were defunct and neglected. Some of the old roads that were in existence in the country were purposely closed down due to fear of invasion of territories. Further, in ancient Ceylon, the villagers were largely self-contained and did not depend on outside world for their daily requirements and roads as such were not considered very essential for these villagers. Thus, the ancient road network that was in existence in the island was gradually encroached and covered by the Jungle. With the onset of foreign invasions by the Western nations in 1505 A.D., communication routes, specially in the South Western coastal areas started re-immersing. Although few roads were opened up under the Portuguese, Dutch and English rulers in the Maritime

Districts from 1505 to 1815, the expansion of road network toward interior parts of the island was found to be negligible except for few old foot paths and jungle routes.

Under the British Colonial era the early development of the modern road network in Sri Lanka commenced in 1820's, after the British conquered the Kandyan Kingdom. Although the Europeans occupied the Maritime Districts of Sri Lanka, they were not able to conquer the Kandyan Kingdom till 1815, mainly due to lack of a proper road network in the country. The Kandyan Kings deliberately avoided from developing roads to avoid invasions from Maritime Districts.



After the rebellion in 1818, the British Governor, Sir. Edward Barnes decided that rather than maintaining several Hill Forts and Military garrisons at isolated locations incurring high expenditure, at a cheaper cost, it is possible for the Government to open up a good network of roads connecting the principal towns of the Kandyan Kingdom with each other, as well as with the Maritime Provinces to control the Kandyan Kingdom and contributing to the security and enrichment of the Colony. He entrusted the construction of the road network to the Military Corps of Pioneers and the first major military road to be constructed was the Colombo - Kandy Road, which was 72 miles long, passing through animal infested jungle in a very rugged terrain. The road including 6 bridges was constructed(1821-1833) adopting the advanced construction methods available at that time for the mobility of heavy bullock carts.

The 800 feet long "**Pontoon Bridge**" across Kelani Ganga at Grandpass(replaced by Victoria iron lattice girder Bridge in 1893-95), Mawanella arch Bridge across Ma Oya, the single span 205 feet long



"Satinwood Bridge" across Mahaweli ganga at Peradeniya (replaced by a steel bridge later in 1890) and the Tunnel through the rock at Kadugannawa pass were the important land marks on this first Military road. Shortly after the initial construction of this military road less bridging, another road connecting Colombo with the Naval Base of Trincomalee, was constructed and these were followed by a number of other trunk roads.

At this time, it was discovered that the climatic conditions of the Kandyan Kingdom were ideal for the planting of valuable cash crops such as coffee. The coffee industry, which commenced in 1830,s rapidly expanded and there was a necessity for a good network of roads for covered with jungle. A good network of roads was required for the transport of goods and provisions for the large working population that was imported from South India to work on the estates and to market the produce to Colombo, to be shipped to Europe. With the rapid growth of the coffee industry, the revenue earned by the country increased very rapidly and part of this revenue diverted for developing the road network especially in the

hilly areas. The road construction programme was undertaken by the Military, while the labour was provided by a strict enforcement of "**Rajakariya**" (system of forced labour for the King). With the expansion of the road network, British control over the Kandyan Kingdom gradually increased and the need for constructing more roads for military purposes, gradually diminished

The road construction programme was entrusted to Captain Dawson and another young military officer named Leuit. Thomas Skinner, who were the pioneers in the road construction industry in the 19th Century. The "Dowson Memorial pillar" at Kadugannawa on Colombo-Kandy road is the monument built in memory of Captain W. Dowson who died during the construction time of the "Great Military Road" (i.e. how the Colombo-Kandy road was first identified) in its last stages from Kadugannawa to Ganethenna section. The

With the major administrative changes brought about by the Colebrooke-Cameron Commission Reforms, the "Rajakariya" system which was made use to get free labour for the road construction had been abolished after 1832 and the subject of road construction was handed over to civilian authorities. Initially by about 1833, the "**Civil Engineers and Surveyors Department**" was formed to be in charge of all public works. Leuit. Thomas Skinner who became a Major subsequently, was appointed as the Commissioner in-charge of roads construction.

As the Engineering needs of the country increased, further responsibilities were added to those originally accepted as public works until the Department was to cover the needs of all state sector civil engineering works. As a result it was made to name as the "**Public Works Department**" (**PWD**). By about 1870, **PWD** was responsible for the construction and maintenance of roads, bridges, buildings, harbour and irrigation works, railways, water supplies and in addition Posts and Telegraphs and electrical and mechanical installations. Major Thomas Skinner is therefore treated as the first **Director of the Public Works Department** ("**DPW**") in Ceylon. He remained in the island for a period of about 50 years till his retirement and the vast network of roads constructed during this period, was under his direction. The organization of the various parts which went to make up the whole department was such, that when the volume and importance of the work of any one branch warranted the action, it could be formed into a self-contained department without detriment to the main structure.

Abolition of Rajakariya system was however became a handicap for the public works due to dearth of labour. The added cost of labour for the Government and the economic crises faced by the Government towards the middle of the 40th decade in 19th century, curtailed the public works. To get over the problem, Government brought in the "Road Ordinance" to get the annual compulsory labour from all male inhabitants of the island between the ages 18 to 55. But this Ordinance did not solve the labour problem for public works and the Colonial Government had to depend largely on immigrant labour from south India to carry out public works at low cost.

It is reported that in 1841, Colombo-Kandy road was laid with broken stone aggregate layer and as a result the travel time for carts carrying coffee from Kandy to Colombo had reduced to 7 days. The roads that were constructed during this period, was designed mainly to cater for animal drawn carts and carriages and for people walking on foot. Hence, these roads were not designed to very high geometric standards that are needed for modern roads. The road network of the country expanded so rapidly that by 1864 there were about 2.550 miles of paved road spread through out the country. It is reported that, "Telford" method of road construction was first adopted in Sri Lanka only after 1861. DPW Mr. Molesworth in 1867 introduced the framing of detail Estimates drawing a clear distinction between maintenance, improvement and construction, abolishing the Lump sum system voted for maintenance of each road. It is also recorded that during his administration as the DPW, the measurement units in terms of "Line", "Square" and "Cube" were introduced. In 1878 draft code of Departmental regulations were amended with specifications for road works. Later in 1884, during the period of DPW, R.K. Mackbudge's administration, the "Macadam" method of road construction was introduced to the island. In 1929, during the period of the DPW, Mr. H.B. Lees, the method of carrying out work departmentally on a schedule of approved rates for each district was introduced and this schedule later separated into two schedules described as Highway Schedule of Rates (HSR) and Building Schedule of Rates. (BSR)

Initially the road compaction was carried out using rollers weighing 15 and 35 cwt, pulled by bulls or elephants. The import of the first steam roller to the island for road construction work was reported in 1891. It was manufactured in England by Aveling & Potar Limited of Kent. There after the steam rollers had been gradually introduced to takeover the task of animal driven rollers. These old steam rollers were continued to use in the island road works till mid 60th decade of the 20th century when it was replaced by the modern diesel rollers.

Some of the major roads that had been constructed during the middle of the 19th Century are given below.

(a)	Colombo - Galle Road was metalled from Colombo to Galle, but unbridged, except for a bridge at Mahamodera about 1 mile from Galle Town. Mail Coaches, carts and foot passengers were all ferried across several river crossings with the help of large "padda" boats, A wooden bridge across Kalu Ganga was constructed in 1848 and was operated as a toll bridge for a period of 10 years.
(b)	Galle - Matara road was metalled between Galle and Matara but the section between Matara and Hambantota had been a bridle path through the jungle.
(c)	The old North coast road to Jaffna that was constructed in 1845 through Negombo, Chilaw, Puttalam and Pooneryn was metalled and bridge upto Negombo and metalled upto Toppu and merely gravelled upto Chilaw. Beyond Chilaw, it was a jungle road upto Puttalam and a

	mere track between Puttalam and Jaffna.
(d)	The North Central Road from Jaffna through Elephant Pass to Matale had been traced and opened up to dambulla. From Dambulla to Matale it was a gravelled road which was unbridged.
(f)	The Kurunegala - Kandy road was metalled but unbridged.
(g)	The Ambepussa - Kurunegala road was metalled and bridged in the 1848.
(h)	Dambulla - Trincomallee road was a mere jungle road except for a short section of road at the Trincomallee end that had been fully developed.
(i)	Badulla - Batticaloa Road, a distance of about 100 miles, was constructed between 1867 and 1873.

According to the statistics available, in 1895 the total millage of roads maintained by the PWD was 3458. In 1948 when Sri Lanka got its Independence from the British Rulers, the total mileage of communication routes in the island was recorded as 30,000 miles. Out of this only about 6457 miles were maintained by the Public Works Department and about 6115 miles of same were in motorable condition. The balance were estate roads, irrigation colony roads, earth roads under local government authorities, jungle tracts and foot paths.

Since setting up of the Public works Department, all Civil and Mechanical Engineering functions including Surveying works of the Government were handled by the Department and the process went on till about 1872. With the commencement of Railway transport, the first to leave the parent body was the railway Department, followed by the Survey Department in 1875, followed by that of Irrigation in 1901. In 1913 various aspects of the Colombo port removed. In 1927, the Electrical Department was set up, and followed by others in 1930 and 1931, except for Buildings, Water Supplies and Sewerage.

Post Independence era

It is believed that more scientific and mechanized methods of road construction was first introduced to the PWD, in mid nineteen fifties, when the Colombo-Kandy road was started laying with Asphalt premix carpet. Continuing this trend soil stabilization methods in road construction was introduced when the 18.25 mile long Aluthnuwara - Padiyathalawa Road which connects Mahiyangana with Batticaloa province, was constructed in the early nineteen sixties with foreign assistance. During this period hither to small technical laboratory of the PWD was improved with foreign assistance and the Research and Development division of the PWD was set up in 1962 with a new Laboratory complex at Ratmalana. The

division was equipped to carry out: deep boring foundation investigations and all standard tests for quality on materials such as Bitumen, Asphalt premix concrete, Soils, Stone aggregates, Cements, Concrete and Reinforcing steel.

The construction of the concrete bridges by the PWD began with the construction of Bridge over Diyawanna oya at Battaramulla in 1954. The first major concrete bridge to be constructed was the New Kelani Bridge across Kelani Ganga at Orugodawatta opened in 1957. A separate complex for the fabrication of pre cast prestressed concrete beams etc. was established at Ratmalana and a large scale prestressed concrete bridge construction programme was started in the late 1950's and about 300 prestressed concrete bridges have been constructed by 1979.

In 1961 the branch to break away was that of Water Supplies and Sewerage. By middle of the 60th decade, the Public Works Department was made up of two main sections, one for Roads, Bridges and Airfield, and the other for Buildings.

In October, 1969 the Public Works Department which was housed in the famous red coloured building named "Transworks House" in Colombo fort, was divided into two separate government organizations namely the **Buildings Department** and **Highways Department**. Construction and maintenance of all public roads and bridges was entrusted to the Highways Department under the **Director of Highways**. The Highways Department was shifted to the adjoining building in the same premises and started to function as a separate Department. However this change was short lived and in 1970 by another Government decision the "**Territorial Civil Engineering Organization**"(TECO) was formed by amalgamating the regional resources under the Irrigation Department and Highways Department. The idea was to avoid duplication of resources in the two civil work organizations and to prevent wastage of funds due to malpractice in the road overseer system for road maintenance. All regional road improvement works, all road maintenance work combined with regional irrigation works were entrusted to the new organization administered under 9 provincial Directors under a Director General. With this new organization the age old Road Overseers system for road maintenance was abolished and the direct labour system was introduced. The functions of the TECO included maintenance and improvement of A,B,C,D and E class roads, maintenance and improvement of Irrigation works, maintenance and improvement of village tanks, irrigation canals and providing assistance to local authorities for improvement of roads and bridges under local authorities. Although Highways Department functioned during this period, its functions were limited to planning, design of major roads and Bridges and construction supervision of major road and bridge works. Further, during this period, the Bridges section of the Highways Department was changed to a state sector Corporation named "**State Development and Construction Corporation**"(SD&CC)

Some of the major road works that were undertaken during the period 1968 - 1977 are as follows :-

1.	Ella - Wellawaya Road - This road which is 17 miles long was completed in 1969 at a cost of Rs. 9.4 million and constructed by the special construction division of the Highways Department
2.	Widening of Colombo - Negombo road from Peliyagoda to Katunayake (14 miles) carried out by the special construction division of the Highways Department.
3.	Dale - Weddagala Road - This road which is 21 miles long was constructed in the early seventies at a cost of 5.5 million. Construction by the SD&CC and supervised by the Highways Department.

In the 20th Century, the mileage of roads maintained by the Public Works Department and later by the Highways Department increased steadily from 6457 miles in 1948 to 15,687 miles in 1979 as shown in the table given below.

Year	Mileage of roads maintained By PWD / Dept. of Highways	Annual maintenance Expenditure (Rs.)	Maintenance Expenditure per mile of road (Rs.)
1931	4,788	6,540,000	1,365
1941	5,948	3,382,000	569
1948	6457		
1951	6,679	12,475,000	1,868
1961	12,456	14,640,000	1,175
1969	14,869	17,223,000	1,158
1979	15,687	-	-

With the Change of Government policies in 1977, TECO was abolished in 1978 and Highways Department was reorganized to take over all road improvement and maintenance works hither to carried out by the TECO, in addition to the special road construction works. To be in readiness with the accelerated road development programme anticipated, in 1983 the Government established the "**Road Development Authority**"(RDA) as a state sector organization to carryout selected construction projects of the Highways Department. RDA formed a joint venture with "Enseng Limited" a Philippine company to get the required resources to carry out the work entrusted by the Highways Department.

As an experimental change in 1984, road maintenance and Improvement work done through direct labour was abolished and entrusted to Departmental Technical Officers who opt to work as Road Maintenance Contractors entrusted with the work by work orders at departmental approved rates. Before long however, in 1986 by a Government decision the Highways Department was abolished. All works hither to be carried out by the Highways department was entrusted to the RDA. The additional staff required to carry out the work of the RDA was absorbed from the experienced people who lost their jobs prematurely due to the abolition of the Highways Department.

Subsequent to these developments, in early 1987 the RDA joint venture with M/s Enseng was terminated. But to continue with the on-going construction projects, by amalgamating the resources of the defunct special construction division of the abolished Highways Department and the RDA resources left over from the joint venture with Enseng, a private company was formed as 100% owned subsidiary of the RDA. The company was registered under the name "**Road Construction and Development Company (Pvt) Ltd.**"(RC&DC)

When RDA took over the functions of the Highways department, road maintenance and improvement work through RMC system was opened to all. and continued till about 1988. Thereafter as all road maintenance and improvement work was entrusted to the RC&DC on works orders as per the policy decisions taken by the Authorities. RC&DC executed the works through RMCC on sub contracting in addition to the direct labour works. In the mean time under the devolution of powers to the provincial councils, all roads except those re-classed as National Highways, were handed over to the Provincial Councils. Only in the North-East province, the direct RMC system supervised by the RDA continued. Later RC&DC started to function in these areas too. As a subsequent development, action was taken by the Authorities to prohibit work through sub contracting by the RC&DC and there for RC&DC started to continue with the direct labour system. As a simultaneous development in 1996, RDA commenced road maintenance though direct labour system to a limited extent and the system is still in force to date.

The first large scale underpass for pedestrian crossing in Sri Lanka was constructed at Kandy by the RC&DC with RDA supervision, utilizing the local resources and talents. In addition, the 300 meter long fly over at Ragama, completed in 1998 by the RC&DC with RDA supervision utilizing local resources and know-how, was the first longest motorable fly over added to the highway net work in Sri Lanka. Close to the same period , the longest motorable single lane bridge ever to build in Sri Lanka was completed by RC&DC with available local resources at Wakwella in Galle District. The Bridge is constructed with a concrete deck on steel rail piles and had a total length around 400 meters.

With the change of administration set up governing the road sector during the 80th decade of the 20th century, Government of Sri Lanka was able to obtain foreign assistance to improve and rehabilitate some of the main highways and major bridges in our highway network. In addition to Foreign Aid Loans from

IMF and ADB, Foreign Aid loans were obtained from international funding institutions of several countries like Japan, Korea, Kuwait etc. Outright grant Aid also received from Japan for reconstruction of old bridges.

Following are some of the major Foreign Aid/Grant Aid Projects carried out during 1985-2003 period.

1. World Bank Project 2 (IBRD loan)
<ul style="list-style-type: none"> Reconstructed Kalutara Bridges on Colombo-Galle-Hambantota-Wellawaya road.
<ul style="list-style-type: none"> Rehabilitated Colombo-Kandy road(A-1).
<ul style="list-style-type: none"> Rehabilitated Kurunegala-Narammala-Madampe road.
<ul style="list-style-type: none"> Rehabilitated Colombo-Horana road and few other roads in the Western Province.
2. World Bank Project 3 (IBRD loan)
<ul style="list-style-type: none"> Rehabilitated Colombo-Galle-Hambantota-Wellawaya road (A-2) from Panadura to Galle.
<ul style="list-style-type: none"> Rehabilitated Galle-Matara road.
3. Asian Development Bank Roads Improvement Project 1 (ADB loan)
<ul style="list-style-type: none"> Rehabilitated Ambepussa-Kurunegala-Dambulla-Anuradhapura road (A-6, A-9)
<ul style="list-style-type: none"> Rehabilitated Matale-Dambulla-Habarana road (A-9, A-6)
4. Asian Development Bank Roads Improvement Project 2 (ADB loan)
<ul style="list-style-type: none"> Rehabilitated Homagama-Avissawella-Hatton road (A-7)
<ul style="list-style-type: none"> Rehabilitated Colombo-Ratnapura-Wellawaya-Batticaloa road (A4) from Avissawella to Ratnapura.
5. Asian Development Bank Roads Improvement Project 3 (ADB loan)
<ul style="list-style-type: none"> Rehabilitated Colombo-Puttalam road (A-3) from Katunayake to Puttalam.
<ul style="list-style-type: none"> Rehabilitated Kandy-Matale road (A-9)

<ul style="list-style-type: none"> Rehabilitated Kurunegala-Puttalam road (A-10)
<ul style="list-style-type: none"> Rehabilitated Kandy-Jaffna Road from 188th Km to 292 Km (A-9)
<p>6. Grant Aid from Japan</p>
<ul style="list-style-type: none"> Reconstruction of Victoria Bridge at Grandpass across Kelani Ganga(Phase I)(Japan Sri Lanka Friendship Bridge).
<ul style="list-style-type: none"> Reconstruction of Narthupana Bridge across Kaluganga.
<ul style="list-style-type: none"> Reconstruction of Kospelana Bridge
<ul style="list-style-type: none"> ReConstruction of Gampola Bridge.
<ul style="list-style-type: none"> Reconstruction of Muwagama Bridge
<p>7. Japan OECF loan</p>
<ul style="list-style-type: none"> Reconstruction of Victoria Bridge at Grandpass across Kelani Ganga(Phase II)(Japan Sri Lanka Friendship Bridge).
<ul style="list-style-type: none"> Rehabilitation of Base Line Road from Kelanitissa Roundabout to Kanatta Junction with a Flyover at Demtagoda and Underpass at Borella. (Phase-1)
<ul style="list-style-type: none"> Rehabilitation of Base Line Road from Kanatta Junction to Highlevel Road Junction (Phase-2)
<p>8. Kuwait loan (KFAED)</p>
<ul style="list-style-type: none"> Reconstruction of bridge no. 1/8 on Ambepussa- Kurunegala-Trincomalee road(A-6).
<ul style="list-style-type: none"> Construction of new Bridge at Mawanella with a Bypass to Colombo-Kandy road(A-1)
<p>9. Korean Loan (EDCF)</p>
<ul style="list-style-type: none"> Rehabilitated Ratnapura to Balangoda section of CRWB road(A4)

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